

Project Manual

Northern Granville County Senior Center

## Granville County

PO Box 877

Oxford, NC 27565

PRE-BID DATE: 2/28/2024  
PRE-BID TIME: 10:00am  
PRE-BID LOCATION: Granville County Stovall Library  
300 Main Street  
Stovall, NC

BID DATE: 03/19/2024  
BID TIME: 3:00pm  
BID LOCATION: Granville County Administration Office  
104 Belle Street  
Oxford, NC 27565



*Ann Collier*

February 19, 2024

## BID SET

### Project Manual

February 2024

Architect's Project Number: 22042

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





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**PROJECT PERSONNEL**

PROJECT: Granville County Senior Center  
Granville County  
Stovall, NC

PROJECT NO: 22042

DATE: February 2024

OWNER: Granville County  
PO Box 877  
Oxford, NC 27565

ARCHITECT: Oakley Collier Architects, P.A.  
109 Candlewood Road  
Rocky Mount, NC 27804  
252-937-2500

CIVIL ENGINEER: Stocks Engineering  
801 East Washington Street  
Nashville, North Carolina 27856

STRUCTURAL ENGINEER: Stewart Engineering  
223 S. West Street, Suite 100  
Raleigh, North Carolina 27603


PME ENGINEER: Atlantec Engineers, PA  
3221 Blue Ridge Road  
Raleigh, North Carolina 27612



**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>
031000	Concrete Forming and Accessories
032000	Concrete Reinforcing
033000	Cast-In-Place Concrete
051200	Structural Steel Framing
054000	Cold Formed Metal Framing
061000	Rough Carpentry
061600	Sheathing
061753	Shop-Fabricated Wood Trusses

<u>Full Name</u>	<u>Discipline</u>	<u>Seal</u>
Stewart, Inc Firm License # C-1051	Structural Engineering	
M. Bryan Covington IV, PE PE License # 045141 223 S. West St Raleigh, NC 27603 Phone: 919-866-4754 E-mail: bcovington@stewartinc.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>
22 00 00	Plumbing Requirements

Full Name

Atlantec Engineers, PA  
Firm License C-961

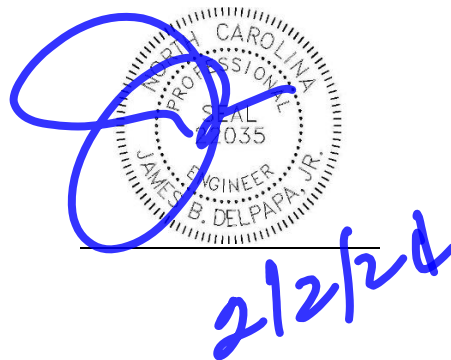
James B DelPapa, Jr, PE  
PE License #022035  
3221 Blue Ridge Rd. Suite 113  
Raleigh, NC 27612  
Phone: 919-571-1111  
E-mail:

[jim@atlantecengineers.com](mailto:jim@atlantecengineers.com)

Discipline

Mechanical Engineer

Seal





**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>
23 00 00	Mechanical Requirements

Full Name

Atlantec Engineers, PA  
Firm License C-961

Patrick J. McCabe, PE

PE License #051195

3221 Blue Ridge Rd. Suite 113

Raleigh, NC 27612

Phone: 919-571-1111

E-mail:

[patirck@atlantecengineers.com](mailto:patirck@atlantecengineers.com)

Discipline

Mechanical Engineer

Seal







**CERTIFICATION OF TECHNICAL SPECIFICATIONS**

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<u>Specification Section</u>	<u>Specification Title</u>
26 00 00	ELECTRICAL REQUIREMENTS

<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)





### 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
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32 91 13	Soil Preparation
32 91 19	Landscape Grading
32 92 19	Seeding
32 92 23	Sodding
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33 12 16	Water Utility Distribution Valves
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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

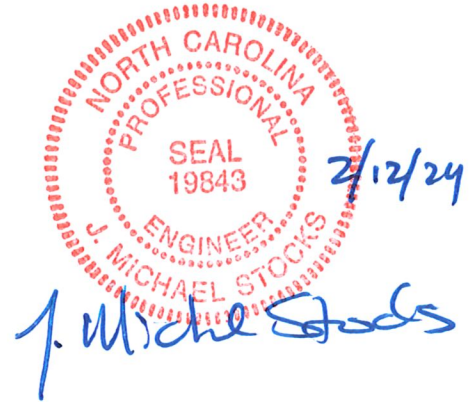
Full Name

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







## **NOTICE TO BIDDERS**

Sealed proposals will be received until 3:00pm on Tuesday, March 19, 2024 at Granville County Administration Office Conference, 104 Belle Street, Oxford, NC 27565, mail at the same address marked to the attention of Scott Phillips and immediately thereafter publicly opened and read for the furnishing of labor, material and equipment entering into the construction of the

North Granville County Senior Center  
Granville County

The Project includes the construction of a new, 8,714 square foot single story building including site development, plumbing, mechanical and electrical systems. The building includes a multipurpose room, dining room with adjacent kitchen, administrative area, craft room, fitness room and outside deck. Construction includes structural steel walls on a slab on grade with stem walls, fiber cement and stone veneer façade and a wood truss roof system.

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 Wednesday February 28, 2024, at the Granville County Stovall Library located at 300 Main Street, Stovall, N.C. 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, North Carolina 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), or by emailing Ashley Seaman (aseaman@oakleycollier.com) beginning February 19, 2024, 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.

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: Granville County  
PO Box 877  
Oxford, NC 27565

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



# **AIA**® Document A701™ – 2018

## **Instructions to Bidders**

for the following Project:

*(Name, location, and detailed description)*

Granville County Senior Center OCA Project # 22042

### **THE OWNER:**

*(Name, legal status, address, and other information)*

Granville County  
PO Box 877  
Oxford, NC 27565

### **THE ARCHITECT:**

*(Name, legal status, address, and other information)*

Oakley Collier Architects, PA  
109 Candlewood Road  
Rocky Mount, NC 27804

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### **ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

**FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.**

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

## ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

## ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- .1 the Bidder has read and understands the Bidding Documents;
- .2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- .3 the Bid complies with the Bidding Documents;
- .4 the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- .6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

## ARTICLE 3 BIDDING DOCUMENTS

### § 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

*(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)*

Email [aseaman@oakleycollier.com](mailto:aseaman@oakleycollier.com)

§ 3.1.2 Any required deposit shall be refunded to Bidders who submit a bona fide Bid and return the paper Bidding Documents in good condition within ten days after receipt of Bids. The cost to replace missing or damaged paper documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the paper Bidding Documents, and the Bidder's deposit will be refunded.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

### § 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven days prior to the date for receipt of Bids.

*(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)*

Email [twilliams@oakleycollier.com](mailto:twilliams@oakleycollier.com)

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

### § 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

#### § 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

#### § 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

*(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)*

By email.

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

### ARTICLE 4 BIDDING PROCEDURES

#### § 4.1 Preparation of Bids

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

#### § 4.2 Bid Security

§ 4.2.1 Each Bid shall be accompanied by the following bid security:

*(Insert the form and amount of bid security.)*

Submit Bid Bond Form AIA (A310-2010), cash or certified check in the amount of 5% of the bid.

§ 4.2.2 The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and shall, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. In the event the Owner fails to comply with Section 6.2, the amount of the bid security shall not be forfeited to the Owner.

§ 4.2.3 If a surety bond is required as bid security, it shall be written on AIA Document A310™, Bid Bond, unless otherwise provided in the Bidding Documents. The attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of an acceptable power of attorney. The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 4.2.4 The Owner will have the right to retain the bid security of Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning days after the opening of Bids, withdraw its Bid and request the return of its bid security.

### § 4.3 Submission of Bids

§ 4.3.1 A Bidder shall submit its Bid as indicated below:

*(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)*

Submit paper copy in compliance with bidding requirements.

§ 4.3.2 Paper copies of the Bid, the bid security, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.3.3 Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.3.4 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.3.5 A Bid submitted by any method other than as provided in this Section 4.3 will not be accepted.

### § 4.4 Modification or Withdrawal of Bid

§ 4.4.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:

*(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)*

Owner shall retain bid security.

## ARTICLE 5 CONSIDERATION OF BIDS

### § 5.1 Opening of Bids

If stipulated in an advertisement or invitation to bid, or when otherwise required by law, Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders.

## **§ 5.2 Rejection of Bids**

Unless otherwise prohibited by law, the Owner shall have the right to reject any or all Bids.

## **§ 5.3 Acceptance of Bid (Award)**

**§ 5.3.1** It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. Unless otherwise prohibited by law, the Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests.

**§ 5.3.2** Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted.

## **ARTICLE 6 POST-BID INFORMATION**

### **§ 6.1 Contractor's Qualification Statement**

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request and within the timeframe specified by the Architect, a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

### **§ 6.2 Owner's Financial Capability**

A Bidder to whom award of a Contract is under consideration may request in writing, fourteen days prior to the expiration of the time for withdrawal of Bids, that the Owner furnish to the Bidder reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. The Owner shall then furnish such reasonable evidence to the Bidder no later than seven days prior to the expiration of the time for withdrawal of Bids. Unless such reasonable evidence is furnished within the allotted time, the Bidder will not be required to execute the Agreement between the Owner and Contractor.

### **§ 6.3 Submittals**

**§ 6.3.1** After notification of selection for the award of the Contract, the Bidder shall, as soon as practicable or as stipulated in the Bidding Documents, submit in writing to the Owner through the Architect:

- .1 a designation of the Work to be performed with the Bidder's own forces;
- .2 names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and
- .3 names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work.

**§ 6.3.2** The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

**§ 6.3.3** Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder's option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

**§ 6.3.4** Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

## **ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND**

### **§ 7.1 Bond Requirements**

**§ 7.1.1** If stipulated in the Bidding Documents, the Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 If the furnishing of such bonds is stipulated in the Bidding Documents, the cost shall be included in the Bid. If the furnishing of such bonds is required after receipt of bids and before execution of the Contract, the cost of such bonds shall be added to the Bid in determining the Contract Sum.

§ 7.1.3 The Bidder shall provide surety bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.

*(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)*

## § 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required bonds to the Owner not later than three days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise provided, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

## ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

- .1 AIA Document A101™–2017, Standard Form of Agreement Between Owner and Contractor, unless otherwise stated below.  
*(Insert the complete AIA Document number, including year, and Document title.)*
  
- .2 AIA Document A101™–2017, Exhibit A, Insurance and Bonds, unless otherwise stated below.  
*(Insert the complete AIA Document number, including year, and Document title.)*  
Use forms included in project manual.
  
- .3 AIA Document A201™–2017, General Conditions of the Contract for Construction, unless otherwise stated below.  
*(Insert the complete AIA Document number, including year, and Document title.)*
  
- .4 AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:  
*(Insert the date of the E203-2013.)*  
Not required.
  
- .5 Drawings

Number	Title	Date	
.6	Specifications		
Section	Title	Date	Pages

.7 Addenda:

Number	Date	Pages
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.8 Other Exhibits:

*(Check all boxes that apply and include appropriate information identifying the exhibit where required.)*

AIA Document E204™–2017, Sustainable Projects Exhibit, dated as indicated below:

*(Insert the date of the E204-2017.)*

Not required.

The Sustainability Plan:

Title	Date	Pages
Not required.		

Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
Not required.			

.9 Other documents listed below:

*(List here any additional documents that are intended to form part of the Proposed Contract Documents.)*

A101-2017  
A312-2010  
A312-2010  
G704-2017  
G706A-1994



**SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**

Note the following changes and additions to the printed AIA Document A701, Instructions to Bidders, 2018 Edition.

**ARTICLE 3 - BIDDING DOCUMENTS**

Add the following subparagraphs to Section 3.2:

"3.2.4 Whenever there are discrepancies between Drawings, or between the Drawings and Specifications, or conflicts within the Specifications, and such discrepancy is not called to the Architect's attention in time to permit clarification by Addendum, the bidder shall base his bid upon providing the better quality or greater quantity of work or material called for, shall submit a written statement with his proposal noting such discrepancies, and shall so furnish and install such better quality or greater quantity unless otherwise ordered in writing."

**ARTICLE 4 - BIDDING PROCEDURES**

Add the following to Subparagraph 4.1.1:

"Proposals shall be submitted on the extra proposal form attached to this Project Manual. The Form of Proposal bound into the Project Manual is for reference only and shall not be removed. Proposals submitted shall include the following items: Single-Prime General Contractor Form of Proposal, Bid Bond, and MBE forms."

Add the following Subparagraphs 4.2.4 and 4.2.5:

4.2.4 Bids shall be accompanied by a cash-deposit or a certified check drawn on and certified by a bank or trust company insured by the Federal Deposit Insurance Corporation, in an amount not less than 5 percent of the bid, or in lieu thereof, a bidder may offer a bid bond of 5 percent of bid.

"4.2.5 Certified checks and/or Bid Bonds shall be pinned or clipped to the Proposal Form."

Add the following to Subparagraph 4.3.1:

"Proposals shall be hand carried to the time and place indicated in the Contract Documents by a representative of the Contractor, in sealed envelopes bearing the address of the Owner, the name of the project, the bidder's name, and State license number. Bids shall be submitted in separate envelopes for single-prime and multi-prime bids. Each bid shall carry separate bid bonds. Bids may also be delivered by certified mail, receipt required."

Add the following to Subparagraph 4.4.1:

"No bid may be withdrawn after the scheduled closing time for receipt of bids for a period of sixty (60) days."

Add the following to Subparagraph 4.4.2:

"Proposals may be modified by an authorized representative of the bidder **IN PERSON AT PLACE OF BID OPENING PRIOR TO TIME OF OPENING BIDS ONLY**. Modifications submitted by any other means **WILL NOT BE CONSIDERED**."

#### **ARTICLE 5 - CONSIDERATION OF BIDS**

Subparagraph 5.3.1 – Delete and substitute the following 5.3.1:

"It is the intention of the Owner to award the contract to the most suited responsive bidder submitting the proposal to the Owner and whose construction skill and financial resources are fully equal to the task of executing the work in a rapid and satisfactory manner, and of completing the work within the time limit. The owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests."

Add the following to subparagraph 5.3.2:

"The Owner's acceptance of any or all alternates will not extend the stated contract time."

"The basis of contract award for the work required for the complete project will be the lowest single-prime bid. Failure of the Proposer to fully and accurately complete the bid form, including names of subcontractors will cause single prime bids to be rejected as non-responsive."

#### **ARTICLE 6 - POST BID INFORMATION**

Delete Paragraph 6.2

Add the following to Subparagraph 6.3.1:

"The successful Bidder(s), within 7 days following the opening of bids, shall submit a letter to the Architect which shall verify that the Contractor(s) complied with the Owner's Minority Business Guidelines and specify any other efforts to the Contractor(s) made to recruit minority subcontractors and minority suppliers for work on this project. This letter should include copies of any advertisements or correspondences the Contractor(s) has made to recruit minority subcontractors and suppliers. Further, a list of awards that have been or will be offered to minority subcontractors and suppliers and a list of others that were recruited shall be included."

Add the following to Subparagraph 6.3.4:

"The Bidder shall furnish upon request adequate data on any named entity on the list in order to permit the Architect and Owner to conduct a proper evaluation. Failure to object to a manufacturer shall not constitute a waiver of any of the requirements of the Contract Documents, and all products furnished by the listed manufacturer must conform to such requirements."

**ARTICLE 7 - PERFORMANCE BOND AND PAYMENT BOND**

Delete subparagraph 7.2.1 and replace with the following subparagraph 7.2.1

"The Bidder shall deliver the required bonds to the Owner prior to the date of execution of the Contract."

**END OF SUPPLEMENTARY INSTRUCTIONS TO BIDDERS**



## **General Conditions of the Contract for Construction**

**for the following PROJECT:**

*(Name and location or address)*

Granville County Senior Center OCA Project # 22042

**THE OWNER:**

*(Name, legal status and address)*

Granville County  
PO Box 877  
Oxford, NC 27565

**THE ARCHITECT:**

*(Name, legal status and address)*

Oakley Collier Architects, PA  
109 Candlewood Road  
Rocky Mount, NC 27804

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- 1 GENERAL PROVISIONS
- 2 OWNER
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- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
- 7 CHANGES IN THE WORK
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- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS
- 14 TERMINATION OR SUSPENSION OF THE CONTRACT
- 15 CLAIMS AND DISPUTES

**ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, *Guide for Supplementary Conditions*.

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## **ARTICLE 1 GENERAL PROVISIONS**

### **§ 1.1 Basic Definitions**

#### **§ 1.1.1 The Contract Documents**

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

#### **§ 1.1.2 The Contract**

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

#### **§ 1.1.3 The Work**

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

#### **§ 1.1.4 The Project**

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

#### **§ 1.1.5 The Drawings**

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

#### **§ 1.1.6 The Specifications**

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

#### **§ 1.1.7 Instruments of Service**

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

#### **§ 1.1.8 Initial Decision Maker**

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

### **§ 1.2 Correlation and Intent of the Contract Documents**

**§ 1.2.1** The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

**§ 1.2.1.1** The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

**§ 1.2.2** Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

**§ 1.2.3** Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

### **§ 1.3 Capitalization**

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

### **§ 1.4 Interpretation**

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

### **§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service**

**§ 1.5.1** The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

**§ 1.5.2** The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

### **§ 1.6 Notice**

**§ 1.6.1** Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

**§ 1.6.2** Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

### **§ 1.7 Digital Data Use and Transmission**

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

### **§ 1.8 Building Information Models Use and Reliance**

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document

G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

## **ARTICLE 2 OWNER**

### **§ 2.1 General**

**§ 2.1.1** The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

**§ 2.1.2** The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

### **§ 2.2 Evidence of the Owner's Financial Arrangements**

**§ 2.2.1** Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

**§ 2.2.2** Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

**§ 2.2.3** After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

**§ 2.2.4** Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

### **§ 2.3 Information and Services Required of the Owner**

**§ 2.3.1** Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

**§ 2.3.2** The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

**§ 2.3.3** If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

**§ 2.3.4** The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

**§ 2.3.5** The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

**§ 2.3.6** Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

#### **§ 2.4 Owner's Right to Stop the Work**

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

#### **§ 2.5 Owner's Right to Carry Out the Work**

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

### **ARTICLE 3 CONTRACTOR**

#### **§ 3.1 General**

**§ 3.1.1** The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

**§ 3.1.2** The Contractor shall perform the Work in accordance with the Contract Documents.

**§ 3.1.3** The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

#### **§ 3.2 Review of Contract Documents and Field Conditions by Contractor**

**§ 3.2.1** Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.



**§ 3.2.2** Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

**§ 3.2.3** The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

**§ 3.2.4** If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

### **§ 3.3 Supervision and Construction Procedures**

**§ 3.3.1** The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

**§ 3.3.2** The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

**§ 3.3.3** The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

### **§ 3.4 Labor and Materials**

**§ 3.4.1** Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

**§ 3.4.2** Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

**§ 3.4.3** The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

### **§ 3.5 Warranty**

**§ 3.5.1** The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

**§ 3.5.2** All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

### **§ 3.6 Taxes**

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

### **§ 3.7 Permits, Fees, Notices and Compliance with Laws**

**§ 3.7.1** Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

**§ 3.7.2** The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

**§ 3.7.3** If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

### **§ 3.7.4 Concealed or Unknown Conditions**

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

**§ 3.7.5** If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

### **§ 3.8 Allowances**

**§ 3.8.1** The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

**§ 3.8.2** Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

**§ 3.8.3** Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

### **§ 3.9 Superintendent**

**§ 3.9.1** The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

**§ 3.9.2** The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

**§ 3.9.3** The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

### **§ 3.10 Contractor's Construction and Submittal Schedules**

**§ 3.10.1** The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

**§ 3.10.2** The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

**§ 3.10.3** The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

### **§ 3.11 Documents and Samples at the Site**

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and

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delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

### **§ 3.12 Shop Drawings, Product Data and Samples**

**§ 3.12.1** Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

**§ 3.12.2** Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

**§ 3.12.3** Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

**§ 3.12.4** Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

**§ 3.12.5** The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

**§ 3.12.6** By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

**§ 3.12.7** The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

**§ 3.12.8** The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

**§ 3.12.9** The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

**§ 3.12.10** The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

**§ 3.12.10.1** If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely

upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

**§ 3.12.10.2** If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

### **§ 3.13 Use of Site**

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

### **§ 3.14 Cutting and Patching**

**§ 3.14.1** The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

**§ 3.14.2** The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

### **§ 3.15 Cleaning Up**

**§ 3.15.1** The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

**§ 3.15.2** If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

### **§ 3.16 Access to Work**

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

### **§ 3.17 Royalties, Patents and Copyrights**

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

### **§ 3.18 Indemnification**

**§ 3.18.1** To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

**§ 3.18.2** In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

## **ARTICLE 4 ARCHITECT**

### **§ 4.1 General**

**§ 4.1.1** The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

**§ 4.1.2** Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

### **§ 4.2 Administration of the Contract**

**§ 4.2.1** The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

**§ 4.2.2** The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

**§ 4.2.3** On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

### **§ 4.2.4 Communications**

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

## ARTICLE 5 SUBCONTRACTORS

### § 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

### § 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

### § 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

### § 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

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When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

## **ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

### **§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts**

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

### **§ 6.2 Mutual Responsibility**

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

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§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

### § 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

## ARTICLE 7 CHANGES IN THE WORK

### § 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

### § 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

### § 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

#### § 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

### ARTICLE 8 TIME

#### § 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

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§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

## § 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

## § 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

## ARTICLE 9 PAYMENTS AND COMPLETION

### § 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

### § 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

### § 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

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**§ 9.3.1.2** Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

**§ 9.3.2** Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

**§ 9.3.3** The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

#### **§ 9.4 Certificates for Payment**

**§ 9.4.1** The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

**§ 9.4.2** The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

#### **§ 9.5 Decisions to Withhold Certification**

**§ 9.5.1** The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;

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- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

**§ 9.5.2** When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

**§ 9.5.3** When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

**§ 9.5.4** If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

**§ 9.6 Progress Payments**

**§ 9.6.1** After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

**§ 9.6.2** The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

**§ 9.6.3** The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

**§ 9.6.4** The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

**§ 9.6.5** The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

**§ 9.6.6** A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

**§ 9.6.7** Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

**§ 9.6.8** Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

### **§ 9.7 Failure of Payment**

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

### **§ 9.8 Substantial Completion**

**§ 9.8.1** Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

**§ 9.8.2** When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

**§ 9.8.3** Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

**§ 9.8.4** When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

**§ 9.8.5** The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

### **§ 9.9 Partial Occupancy or Use**

**§ 9.9.1** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

**§ 9.9.2** Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

**§ 9.9.3** Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

### **§ 9.10 Final Completion and Final Payment**

**§ 9.10.1** Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

**§ 9.10.2** Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

**§ 9.10.3** If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

**§ 9.10.4** The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

**§ 9.10.5** Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

## **ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

### **§ 10.1 Safety Precautions and Programs**

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

### **§ 10.2 Safety of Persons and Property**

**§ 10.2.1** The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

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- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

#### § 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

#### § 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will

promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

**§ 10.3.3** To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

**§ 10.3.4** The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

**§ 10.3.5** The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

**§ 10.3.6** If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

#### **§ 10.4 Emergencies**

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

### **ARTICLE 11 INSURANCE AND BONDS**

#### **§ 11.1 Contractor's Insurance and Bonds**

**§ 11.1.1** The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

**§ 11.1.2** The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

**§ 11.1.3** Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

**§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance.** Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or

expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

## **§ 11.2 Owner's Insurance**

**§ 11.2.1** The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

**§ 11.2.2 Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

**§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

## **§ 11.3 Waivers of Subrogation**

**§ 11.3.1** The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

**§ 11.3.2** If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

#### **§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance**

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

#### **§11.5 Adjustment and Settlement of Insured Loss**

**§ 11.5.1** A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

**§ 11.5.2** Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

### **ARTICLE 12 UNCOVERING AND CORRECTION OF WORK**

#### **§ 12.1 Uncovering of Work**

**§ 12.1.1** If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

**§ 12.1.2** If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

#### **§ 12.2 Correction of Work**

##### **§ 12.2.1 Before Substantial Completion**

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

##### **§ 12.2.2 After Substantial Completion**

**§ 12.2.2.1** In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during

that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

### § 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

## ARTICLE 13 MISCELLANEOUS PROVISIONS

### § 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

### § 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

### § 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

## § 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

## § 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

### § 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

#### § 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

#### § 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

#### § 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;

- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

**§ 14.4.3** In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

## **ARTICLE 15 CLAIMS AND DISPUTES**

### **§ 15.1 Claims**

#### **§ 15.1.1 Definition**

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

#### **§ 15.1.2 Time Limits on Claims**

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

#### **§ 15.1.3 Notice of Claims**

**§ 15.1.3.1** Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

**§ 15.1.3.2** Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

#### **§ 15.1.4 Continuing Contract Performance**

**§ 15.1.4.1** Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

**§ 15.1.4.2** The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

#### **§ 15.1.5 Claims for Additional Cost**

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

#### **§ 15.1.6 Claims for Additional Time**

**§ 15.1.6.1** If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.



**§ 15.1.6.2** If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

**§ 15.1.7 Waiver of Claims for Consequential Damages**

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

**§ 15.2 Initial Decision**

**§ 15.2.1** Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

**§ 15.2.2** The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

**§ 15.2.3** In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

**§ 15.2.4** If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

**§ 15.2.5** The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

**§ 15.2.6** Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

**§ 15.2.6.1** Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

**§ 15.2.7** In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

**§ 15.2.8** If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

### **§ 15.3 Mediation**

**§ 15.3.1** Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

**§ 15.3.2** The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

**§ 15.3.3** Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

**§ 15.3.4** The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

### **§ 15.4 Arbitration**

**§ 15.4.1** If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

**§ 15.4.1.1** A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

**§ 15.4.2** The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

**§ 15.4.4 Consolidation or Joinder**

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.



**SUPPLEMENTARY GENERAL CONDITIONS**

**STANDARD AIA FORMS**

General Conditions of the Contract Standard Form A201 (Latest Edition) of the American Institute of Architects are hereby made a part of the specifications and are bound herein. The General Conditions including Modifications and Special Conditions herein, shall become a part of the contract, and shall apply to all Contractors and all subcontractors.

**SUPPLEMENTS TO AIA DOCUMENTS A201**

The following supplements modify, change, delete from or add to the "General Conditions of the Contract for Construction, 'AIA Document A201.' Where any Article of the General Conditions is modified, or any Paragraph, Subparagraph or Clause thereof is modified or any Paragraph, Subparagraph or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Article, Paragraph, Subparagraph or Clause shall remain in effect.

**ARTICLE 1 GENERAL PROVISIONS**

**1.1 BASIC DEFINITIONS**

Add the following:

**1.1.5.1 PRODUCT**

The term "product" as used in the Contract Documents includes materials, systems and equipment.

**1.1.6.1 PROJECT MANUAL**

The term "Project Manual" as used in this section is the volume that includes the bidding requirements, Conditions of the Contract and the Specifications.

**1.1.8 CONTRACTOR**

The term "Contractor" shall mean the Contractor involved with this project.

**1.1.9 GENERAL CONTRACTOR**

The term "General Contractor" shall mean the Contractor responsible for the General Contract Work.

**1.1.10 SUBCONTRACTOR**

The term "subcontractor" shall mean subcontractor employed by the Contractor.

## **ARTICLE 3 CONTRACTOR**

### **3.3 SUPERVISION AND CONSTRUCTION PROCEDURES**

Add the following paragraph:

3.3.2.1 - 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.

### **3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**

Add the following paragraphs:

3.12.11.1 - Products are generally specified by ASTM or other reference standard, and/or by manufacturer's name and model number or trade number. 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.

3.12.11.2 - After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified, under the following conditions:

1. The request is accompanied by complete data on the proposed substitution substantiating compliance with the Contract Documents including product identification and description, performance and test data, references and samples where applicable, and an itemized comparison of the proposed substitution with the products specified or named by Addenda, with data relating to Contract time schedule, design and artistic effect where applicable, and its relationship to separate contracts.
2. The request is accompanied by accurate cost data on the proposed substitution in comparison with the product specified, whether or not modification of the Contract Sum is to be a consideration.

3.12.11.3 - Requests for substitution based on Clause 3.12.11.2 above, when forwarded by the Contractor to the Architect, are understood to mean that the Contractor:

1. Represents that he has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified.
2. Will provide the same guarantee for the substitution that he would for that specified;
3. Certified that the cost data presented is complete and include all related costs under this Contract, but excludes costs under separate contracts and the Architect's redesign costs, and

that he waives all claims for additional costs related to the substitution which subsequently become apparent; and

4. Will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects.

3.12.11.4 - Substitutions will not be considered if:

1. They are indicated or implied on shop drawing submissions without the formal request required in Clause 4.4.1.3 above; or

2. For their implementation they require a substantial revision of the Contract Documents in order to accommodate their use.

3.12.11.5 - When required, three samples of sufficient size to indicate general visual effect shall be submitted. Where samples must show a range of color, texture, finish, graining, or other similar property, submit three sets of pairs illustrating the full scope of this range. One set of "Approved" samples will be retained at the Architect's project office.

### **3.15 CLEANING UP**

Add the following paragraph:

3.15.1.1 - The Contractor shall remove rubbish and leave the building broom clean, clean all glass, replace all broken glass, remove stains, spots, marks, and dirt from the decorated work: clean hardware, remove paint spots and smears from all surfaces, clean fixtures and wash all concrete, tile and cement floors, polish all resilient floors. Cleanup will be performed at the end of each day and will be monitored by the Owner and Architect.

## **ARTICLE 4 ARCHITECT**

### **4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT**

Add the following paragraphs:

4.2.1.1 - 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.

4.2.1.2 - All work shall be inspected by designer and/or special inspector 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 re-inspection all costs associated with additional re-inspections shall be borne by the contractor.

4.2.1.3 - 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.

4.2.1.4 - Should any work be covered up or concealed prior to inspection and approval by the designer and/or special inspector 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.

4.2.6.1 - Mechanics whose work is unsatisfactory to the owner, or unskilled or otherwise objectionable, shall be instantly dismissed from the work upon notice of the Architect.

## **ARTICLE 5 SUBCONTRACTORS**

### **5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK**

5.2.1 - Change first sentence to read: Unless otherwise required by the Contract Documents or the Bidding Documents, the Contractor, within 5 days from the contract date, shall furnish to the owner and architect in writing the names or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each of the principal portions of the work.

## **ARTICLE 7 CHANGES IN THE WORK**

### **7.2 CHANGE ORDERS**

Add the following paragraphs:

7.2.2 – 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, and Owner 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 7.2.2.2 herein. If neither party elects to proceed under 7.2.2.2, 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.



7.2.3 - Under Paragraph 7.2.2, the allowances for overhead and profit combined shall be as follows: all contractors (the single contracting entity (prime), his subcontractors(1st tier subs), or their sub-subcontractors (2nd tier subs, 3rd tier subs, etc.)) shall be allowed a maximum of 10% on work they each self-perform; the prime contractor shall be allowed a maximum of 5% on contracted work of his 1st tier sub; 1<sup>st</sup> tier, 2nd tier, 3rd tier, etc. contractors shall be allowed a maximum of 2.5% on the contracted work of their subs. ; Under Method "c(1)", no additional allowances shall be made for overhead and profit. In the case of deductible change orders, under 7.2.2, the contractor shall include no less than five percent (5%) profit, but no allowances for overhead.

7.2.4 - 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.
6. Overtime and extra pay for holidays and weekends may be a cost item only to the extent approved by the owner.

7.2.5 - 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 in 7.2.4.

7.2.6 - 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.

7.2.7 - 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.

## **ARTICLE 8 TIME**

### **8.2 PROGRESS AND COMPLETION**

Delete and substitute the following:

8.2.3 - "The Contractors shall commence work to be performed under this agreement on a date to be specified in a written order from the architect or corresponding to the date of the Pre-construction conference and shall fully complete all work hereunder as follows:

**30** Days

### **8.3 DELAYS AND EXTENSIONS OF TIME**

Add the following paragraphs:

8.3.1.1 - 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.

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

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

8.3.1.4 - 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. 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.

### **Liquidated Damages**

Time extensions for weather delays do not entitle the Contractor to extended overhead recovery. As outlined in Article 3 of the Agreement, the Contractor agrees to pay \$500.00 per day liquidated damages to the owner for each calendar day the Contractor shall be in default.

## **ARTICLE 9 PAYMENTS AND COMPLETION**

### **9.3 APPLICATIONS FOR PAYMENTS**

Add the following paragraphs:

9.3.1 - The form of Application of Payment shall be on AIA Document G702 "Application and Certificate for Payment".

9.3.1.1 - Until final payment the Owner will pay ninety-five (95%) percent of the amount due the Contractor on account of progress payments. There will be no reduction in the (5) percent retainage withheld after substantial completion. Retainage will be released upon final completion and acceptance of the project and receipt of the Certificate of Compliance with the building inspection authority having jurisdiction over the project. The General Contractor shall be responsible for securing such certification.

## **ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

### **10.1 SAFETY PRECAUTIONS AND PROGRAMS**

Add the following Subparagraphs 10.1.5 and 10.1.6 to Paragraph 10.1:

10.1.5 - If reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop the Work in the affected area and report the condition to the Owner and Architect in writing. The Owner, Contractor and Architect shall then proceed in the same manner described in Subparagraph 10.1.2.

10.1.6 - The Owner shall be responsible for obtaining the services of a licensed laboratory to verify a presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to verify that it has been rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and

Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has a reasonable objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection.

**ARTICLE 11 INSURANCE AND BONDS**

**11.1 CONTRACTOR'S LIABILITY INSURANCE:**

Modify the following:

11.1.1.8 - Liability insurance shall include all major divisions of coverage and be on a comprehensive basis including:

Premises-Operations (including X-C-U)  
Independent Contractor's protective.

Products and completed operations.  
Contractual-including specified provisions for the Contractors obligations under paragraph 4.18.  
Owned, non-owned and hired motor vehicles.  
Broad form coverage for property damage.

Add the following:

11.1.2.1 - Provide the following insurance limits:

Workers Compensation

Applicable Federal, State	<u>\$Statutory</u>
Employer's Liability - Each Accident	<u>\$1,000,000.00</u>
Disease Policy Limit	<u>\$1,000,000.00</u>
Disease Limit per Each Employee	<u>\$1,000,000.00</u>

Contractor's LIABILITY INSURANCE (clauses 1.1.1.2,.3,.4,.5,.6,.7) including CONTRACTUAL LIABILITY (subparagraph 11.1.2)

Form of insurance shall be:

Comprehensive General Liability  
Comprehensive Automobile Liability

NOTE: The Owner and the Architect shall be included as additional insured parties on the Comprehensive General Liability Policy.

(1) BODILY INJURY	
Each Occurrence	<u>\$1,000,000.00</u>
General Aggregate	<u>\$2,000,000.00</u>
Product Liability Completed Operations Aggregate	<u>\$2,000,000.00</u>
(2) PROPERTY DAMAGE - including completed operations broad form and X,C,U	
Each Occurrence	<u>\$1,000,000.00</u>
Aggregate	<u>\$2,000,000.00</u>
(3) PERSONAL INJURY	
Each Persons Aggregate	<u>\$ 500,000.00</u>
General Aggregate	<u>\$1,000,000.00</u>
Catastrophic Liability	<u>\$1,000,000.00</u>
(4) AUTOMOBILE LIABILITY - owned, non-owned and hired	
Bodily Injury each person	<u>\$2,000,000.00</u>
Bodily Injury each accident	<u>\$2,000,000.00</u>
Property Damaged each occurrence	<u>\$ 500,000.00</u>
(5) INSTALLATION FLOATER - Per Project Requirements to Be Based Upon the Most Expensive Piece of Equipment to Be Provided.	
(6) BUSINESS UMBRELLA POLICY	
Over Primary Insurance	<u>\$2,000,000.00</u>
Retention	<u>\$ 10,000.00</u>

### 11.3 PROPERTY INSURANCE

Delete in its entirety and substitute:

11.3.1 - The Contractor shall purchase and maintain property insurance upon the entire work at the site to the full insurable value thereof. The insurance shall include the interest of the Owner, Architect/Engineer, the Contractor, and subcontractors in the work and shall insure against the perils of fire and extended coverage and shall include "all risk" insurance for physical loss or damage including without duplication of coverage, theft, vandalism and malicious mischief. The Contractor shall effect and maintain similar property insurance on portions of the work stored off the site or in transit when such portions of the work are to be included in an Application for Payment under Subparagraph 9.3.2.

The Architect/Engineer will also be insured under this policy to insure their interests.

Fire, Extended Coverage, Vandalism and Malicious Mischief in the names of the Owner, Architect/Engineer and Contractor as their interests may appear with limits as follows:

Amount equal to the Contract Sum for the Work

Independent Contractors: Same limits as above.

Products and Completed Operation:

Same limits as above for one (1) year, commencing with issuance of final certificate of payment.

Contractual Liability:

Same limits as above.

11.3.1.1 - Furnish three (3) copies of Certificates herein required; specifically setting forth evidence of all coverage required by Subparagraphs 11.1.1.

11.3.1.2 - The form of the Certificate shall be ACORD 25-S supplemented as necessary with AIA Document G715. Furnish copies of any endorsements that are subsequently issued amending coverage of limits. The Contractor shall furnish to the Owner copies of any endorsements that are subsequently issued amending coverage or limits.

11.3.1.3 - If this insurance is written with stipulated amounts deductible under the terms of the policy, the Contractor shall pay the difference attributable to deductions in any payments made by the insurance carrier on claims paid by this insurance.

11.3.1.5 - The insurance required by Paragraph 11.3 is not intended to cover machinery, tools or equipment owned or rented by the Contractor, which are utilized in the performance of the Work but not incorporated into the permanent improvements. The Contractor shall, at the Contractor's own expense, provide insurance coverage for owned or rented machinery, tools or equipment which shall be subject to the provisions of Subparagraph 11.3.7.

### **11.3.2 BOILER AND MACHINERY INSURANCE**

Modify as follows:

11.3.2 - Change the first sentence to read, "The Contractor shall purchase and maintain such boiler and machinery insurance as may be required by the contract documents or by law.

Modify as follows:

11.3.6 - In the last sentence change "will not be cancelled" to "shall not be cancelled".

Add the following paragraph:

11.3.12 - The Contractor shall file the original and one certified copy of all policies with the owner and architect before exposure to loss may occur. If the owner is damaged by the failure of the Contractor to

maintain such insurance and to so notify the owner, then the Contractor shall bear all reasonable costs properly attributable thereto.

**11.4 PERFORMANCE BOND AND PAYMENT BOND:**

11.4.1.1 - Add the following sentence:

"Prior to signing contract, Contractor shall pay the premium for and furnish Performance and Payment Bond in the amount of the contract price on Form AIA 311 to cover faithful performance of the contract and payment of all obligations arising thereunder. Bonds shall be in such form as Owner may prescribe and with sureties as he may approve. Copy of Agent's Power-of-Attorney, giving him authority to sign bond and shall be furnished to the Architect. The Contractor shall provide six (6) copies."

**ARTICLE 15 CLAIMS AND DISPUTES**

**15.1.4 CLAIMS FOR ADDITIONAL COST**

Add the following paragraphs:

15.1.4.1 - 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. 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.

15.1.4.2 - 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.

**ADD THE FOLLOWING ARTICLES 16-24:**

**ARTICLE 16 UTILITIES, STRUCTURES, SIGNS**

The General Contractor shall call ULOCO at 1-800-632-4949 before conducting any sitework in order to avoid damaging existing underground utilities services.

The General Contractor shall provide necessary and adequate facilities and pay all costs for water, electricity, gas, oil, sewer, and other services that may be necessary and required for completion of the project according to the Contract Documents. Any permanent meters installed shall be Owner.

Meters shall be relisted in the Owner's name on the day following completion and acceptance of the General Contractor's work, and the Owner shall pay for services used after that date.

The Owner shall be reimbursed for all metered utility service charges paid by or attributed to the Owner 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 Architect.

The General Contractor shall provide temporary plumbing, Heating and Electrical systems as required for his work and the work of other Prime Contractors until the permanent systems can be utilized for temporary purposes.

- A. Prior to acceptance of work by the Owner, each contractor shall remove and replace any parts of the permanent building systems damaged through use during construction.
- B. Temporary filters shall be installed in each of the heating and air conditioning units during construction.
- C. Extra effort shall be maintained to keep the building clean and under no circumstances shall air systems be operated if finishing operations are creating dust in excess of what would be considered normal if the building were occupied. Provide filter media on return air grilles. The intent is to present the duct system in a clean condition at final inspection.
- D. 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.
- E. When the permanent lighting system is used during the finishing stages of construction, lamps shall be replaced and shall be new at the time of final inspection.

The General Contractor shall provide temporary toilet facilities for male and female employees as required. These facilities will be available to other contractors on the job and shall be kept in a neat sanitary condition at all times. Chemical toilets are acceptable.

The General Contractor shall erect a temporary field office, complete with lights, telephone, heat and air conditioning.

## **ARTICLE 17 GUARANTEE**



This Contractor shall guarantee in writing the materials and workmanship for a period of one year from the date of final acceptance by the Owner. This Contractor shall replace and/or repair, without cost to the Owner, any defective part or parts within the guarantee period.

#### **ARTICLE 18 STORAGE OF MATERIALS**

The Contractor shall make provisions for storage of materials on the site. Consult the owner for available space on the site.

#### **ARTICLE 19 DEMOLITION**

The General Contractor shall be responsible for all demolition and capping of all plumbing, HVAC and electrical lines.

#### **ARTICLE 20 GUARANTEES AND OPERATION INSTRUCTION**

All guarantees, warranties, operation instructions, maintenance instructions, etc. shall be delivered to the architect in triplicate, bound in a suitable three ring notebook. Originals with photocopies are acceptable.

#### **ARTICLE 21 PARTIAL UTILIZATION BENEFICIAL OCCUPANCY**

The Owner may desire to occupy all or a portion of the project when the work is substantially complete.

Prior to the final payment, the Owner may request the Contractor(s) in writing, through the Architect if applicable, to permit him to use a specified part of the project that he believes he may use without significant interference with construction of the other parts of the project. If the contractor(s) agree, the Architect will schedule a beneficial occupancy inspection after which the Architect may issue a Certificate of Substantial Completion. The certificate shall include the following documentation:

1. Date of substantial completion.
2. A tentative list of items to be completed or corrected before final payment.
3. Establishing responsibility between Contractor and Owner for maintenance, heat utilities and insurance.
4. Establishing the date for guarantees and warranties under terms of the Contract.
5. Consent of Surety.
6. Endorsement from Insurance Company permitting occupancy.

The Owner shall have the right to exclude the Contractor from any part of the project which the Architect 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.

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 Architect may prorate liquidated damages based on the percentage of project occupied.

#### **ARTICLE 22 CODES AND STANDARDS**

Wherever reference is given to codes, or 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 23 ASBESTOS CONTAINING MATERIALS**

Each Prime Contractor to provide an affidavit certifying that building materials, equipment, or any other component of this project does not contain asbestos.

#### **ARTICLE 24 RECORD DRAWINGS**

The General Contractor shall maintain (1) set of marked up construction drawings and specifications in addition to the working set normally used on the job. These record drawings will be presented to the Architect in good legible and clean condition at the completion of the project for record purposes.

#### **END OF SUPPLEMENTARY GENERAL CONDITIONS**

**FORM OF SINGLE PRIME GENERAL CONTRACTOR PROPOSAL**

North Granville County Senior Center  
Granville County  
Architect's Project # 22042

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 Granville County in the form of contract specified, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation, and labor necessary to complete the construction of the Granville County Senior Center, in full accordance with the plans, specifications, and contract documents, to the full and entire satisfaction of Granville County with a definite understanding that no money will be allowed for extra work except as set forth in the General Conditions and Contract Documents for the sum of:

**SINGLE PRIME CONTRACT:**

**BASE BID**

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

**Subcontractors:**

**License No.**

**Dollars(\$)**

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

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

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

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

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 Architect and shall fully complete all work within **365** consecutive calendar days from date of commencement established in a Notice to Proceed.

BIDDER further agrees to pay as liquidated damages, the sum of \$500 for each consecutive calendar day thereafter as provided in Section 15 of the General Conditions.

**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 in all accordance with the contract documents.

**GENERAL CONTRACT:**

Unit Price No. 1: Rock Excavation per 1 cu yd Unit Price (\$)\_\_\_\_\_

Cost for additional 500 cu yds included in Base Bid Price (\$)\_\_\_\_\_

Unit Price No. 2: Undercut/Fill in Trench Excavations per 1 cu yd Unit Price (\$)\_\_\_\_\_

Cost for additional 100 cu yds included in Base Bid Price (\$)\_\_\_\_\_

Unit Price No. 3: Undercut/Fill in Open Excavations per 1 cu yd Unit Price (\$)\_\_\_\_\_

Cost for additional 2,500 cu yds included in Base Bid Price (\$)\_\_\_\_\_

Unit Price No. 4: Data Outlet and Conduit per 1 Occurrence Unit Price (\$) \_\_\_\_\_

Cost for additional 12 occurrences Price (\$)\_\_\_\_\_

Unit Price No. 5: Duplex Receptacle and Circuit: per 1 Occurrence Unit Price (\$)\_\_\_\_\_

Cost for additional 12 occurrences Price (\$)\_\_\_\_\_

Unit Price No. 6: Transformer Feeder per 1 Linear Foot Unit Price (\$)\_\_\_\_\_

Cost for additional 200 linear feet included in Base Bid Price (\$)\_\_\_\_\_

Unit Price No. 7: Generator Feeder: per 1 Linear Foot Unit Price (\$)\_\_\_\_\_

Cost for additional 200 linear feet included in Base Bid Price (\$)\_\_\_\_\_

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: \_\_\_\_\_

\_\_\_\_\_

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

Proprietorship or Partnership

(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 \_\_\_\_\_

**For All Official Notices:**

---

Name and Title

---

Name of Firm/Corporation

---

Street Address, City, State and Zip

---

Telephone and Fax Numbers

## 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.

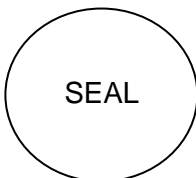
The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure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

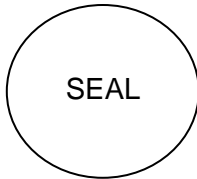
The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement. The Bidder agrees to make a Good Faith Effort to utilize minority suppliers where possible.

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

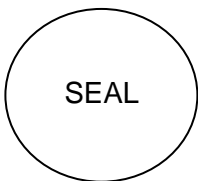
\*Minority categories: Black, African American (**B**), Hispanic (**H**), Asian American (**A**) American Indian (**I**), Female (**F**) Socially and Economically Disadvantaged (**D**)

**\*\* 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.

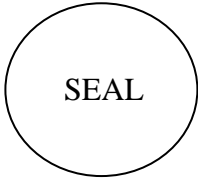
Pursuant to GS143-128.2(d), the undersigned will enter into a formal agreement with Minority Firms for work listed in this schedule conditional upon execution of a contract with the Owner. Failure to fulfill this commitment may constitute a breach of the contract.

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 \_\_\_\_\_



## Bid Bond

**CONTRACTOR:**

*(Name, legal status and address)*

**SURETY:**

*(Name, legal status and principal place of business)*

**OWNER:**

*(Name, legal status and address)*

**BOND AMOUNT: \$**

**PROJECT:**

*(Name, location or address, and Project number, if any)*

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

**ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

Signed and sealed this day of ,

\_\_\_\_\_  
(Contractor as Principal)

\_\_\_\_\_  
(Seal)

\_\_\_\_\_  
(Witness)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Surety)

\_\_\_\_\_  
(Seal)

\_\_\_\_\_  
(Witness)

\_\_\_\_\_  
(Title)

*[Faint, illegible text, likely bleed-through from the reverse side of the page]*

Init.

 **AIA**<sup>®</sup> Document A101<sup>™</sup> – 2017

**Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum**

**AGREEMENT** made as of the    day of    in the year  
*(In words, indicate day, month and year.)*

**BETWEEN** the Owner:  
*(Name, legal status, address and other information)*

and the Contractor:  
*(Name, legal status, address and other information)*

for the following Project:  
*(Name, location and detailed description)*

The Architect:  
*(Name, legal status, address and other information)*

The Owner and Contractor agree as follows.

**ADDITIONS AND DELETIONS:**  
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101<sup>™</sup>-2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201<sup>™</sup>-2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

**TABLE OF ARTICLES**

- 1 THE CONTRACT DOCUMENTS**
- 2 THE WORK OF THIS CONTRACT**
- 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION**
- 4 CONTRACT SUM**
- 5 PAYMENTS**
- 6 DISPUTE RESOLUTION**
- 7 TERMINATION OR SUSPENSION**
- 8 MISCELLANEOUS PROVISIONS**
- 9 ENUMERATION OF CONTRACT DOCUMENTS**

**EXHIBIT A INSURANCE AND BONDS**

**ARTICLE 1 THE CONTRACT DOCUMENTS**

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

**ARTICLE 2 THE WORK OF THIS CONTRACT**

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

**ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION**

**§ 3.1** The date of commencement of the Work shall be:

*(Check one of the following boxes.)*

- The date of this Agreement.
- A date set forth in a notice to proceed issued by the Owner.
- Established as follows:  
*(Insert a date or a means to determine the date of commencement of the Work.)*

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

**§ 3.2** The Contract Time shall be measured from the date of commencement of the Work.

**§ 3.3 Substantial Completion**

**§ 3.3.1** Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

*(Check one of the following boxes and complete the necessary information.)*

Init.

[ ] Not later than ( ) calendar days from the date of commencement of the Work.

[ ] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

Portion of Work	Substantial Completion Date
-----------------	-----------------------------

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

#### ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be (\$ ), subject to additions and deductions as provided in the Contract Documents.

#### § 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

Item	Price
------	-------

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement. (Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance
------	-------	---------------------------

§ 4.3 Allowances, if any, included in the Contract Sum: (Identify each allowance.)

Item	Price
------	-------

§ 4.4 Unit prices, if any:

(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

Item	Units and Limitations	Price per Unit (\$0.00)
------	-----------------------	-------------------------

§ 4.5 Liquidated damages, if any:

(Insert terms and conditions for liquidated damages, if any.)

§ 4.6 Other:

(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

## ARTICLE 5 PAYMENTS

### § 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the day of the month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than ( ) days after the Architect receives the Application for Payment.

*(Federal, state or local laws may require payment within a certain period of time.)*

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201™–2017, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201–2017;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201–2017; and
- .5 Retainage withheld pursuant to Section 5.1.7.

### § 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

*(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)*

**§ 5.1.7.1.1** The following items are not subject to retainage:  
*(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)*

**§ 5.1.7.2** Reduction or limitation of retainage, if any, shall be as follows:  
*(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)*

**§ 5.1.7.3** Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:  
*(Insert any other conditions for release of retainage upon Substantial Completion.)*

**§ 5.1.8** If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201–2017.

**§ 5.1.9** Except with the Owner’s prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

**§ 5.2 Final Payment**

**§ 5.2.1** Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor’s responsibility to correct Work as provided in Article 12 of AIA Document A201–2017, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

**§ 5.2.2** The Owner’s final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect’s final Certificate for Payment, or as follows:

**§ 5.3 Interest**

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.  
*(Insert rate of interest agreed upon, if any.)*

%

**ARTICLE 6 DISPUTE RESOLUTION**

**§ 6.1 Initial Decision Maker**

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201–2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.  
*(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)*

## § 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201–2017, the method of binding dispute resolution shall be as follows:

*(Check the appropriate box.)*

- [ ] Arbitration pursuant to Section 15.4 of AIA Document A201–2017
- [ ] Litigation in a court of competent jurisdiction
- [ ] Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

## ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2017.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201–2017, then the Owner shall pay the Contractor a termination fee as follows:

*(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)*

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2017.

## ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2017 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:

*(Name, address, email address, and other information)*

§ 8.3 The Contractor's representative:

*(Name, address, email address, and other information)*



§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum, Exhibit A, Insurance and Bonds, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in AIA Document A101™-2017 Exhibit A, and elsewhere in the Contract Documents.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201-2017, may be given in accordance with AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

*(If other than in accordance with AIA Document E203-2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)*

§ 8.7 Other provisions:

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101™-2017, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101™-2017, Exhibit A, Insurance and Bonds
- .3 AIA Document A201™-2017, General Conditions of the Contract for Construction
- .4 AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, dated as indicated below:  
*(Insert the date of the E203-2013 incorporated into this Agreement.)*

.5 Drawings

Number	Title	Date
--------	-------	------

.6 Specifications

Section	Title	Date	Pages
---------	-------	------	-------

.7 Addenda, if any:

Number	Date	Pages
--------	------	-------

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

*(Check all boxes that apply and include appropriate information identifying the exhibit where required.)*

Init.

[ ] AIA Document E204™-2017, Sustainable Projects Exhibit, dated as indicated below:  
(Insert the date of the E204-2017 incorporated into this Agreement.)

[ ] The Sustainability Plan:

Title	Date	Pages
-------	------	-------

[ ] Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
----------	-------	------	-------

.9 Other documents, if any, listed below:

*(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201™-2017 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)*

This Agreement entered into as of the day and year first written above.

\_\_\_\_\_  
OWNER (Signature)

\_\_\_\_\_  
CONTRACTOR (Signature)

\_\_\_\_\_  
(Printed name and title)

\_\_\_\_\_  
(Printed name and title)

 **AIA**® Document A312™ – 2010

**Performance Bond**

**CONTRACTOR:**  
*(Name, legal status and address)*

**SURETY:**  
*(Name, legal status and principal place of business)*

**OWNER:**  
*(Name, legal status and address)*

**CONSTRUCTION CONTRACT**

Date:  
Amount: \$  
Description:  
*(Name and location)*

**BOND**  
Date:  
*(Not earlier than Construction Contract Date)*

Amount: \$  
Modifications to this Bond:  None  See Section 16

<b>CONTRACTOR AS PRINCIPAL</b>	<b>SURETY</b>
Company: <i>(Corporate Seal)</i>	Company: <i>(Corporate Seal)</i>
Signature: _____	Signature: _____
Name and	Name and
Title:	Title:

*(Any additional signatures appear on the last page of this Performance Bond.)*

*(FOR INFORMATION ONLY — Name, address and telephone)*

<b>AGENT or BROKER:</b>	<b>OWNER'S REPRESENTATIVE:</b>
	<i>(Architect, Engineer or other party:)</i>

**ADDITIONS AND DELETIONS:**  
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

**§ 1** The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

**§ 2** If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Section 3.

**§ 3** If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after

- .1 the Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Section 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;
- .2 the Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and
- .3 the Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

**§ 4** Failure on the part of the Owner to comply with the notice requirement in Section 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

**§ 5** When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

**§ 5.1** Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

**§ 5.2** Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

**§ 5.3** Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and a contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

**§ 5.4** Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

**§ 6** If the Surety does not proceed as provided in Section 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

**§ 7** If the Surety elects to act under Section 5.1, 5.2 or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the

Init.

Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication, for

- .1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;
- .2 additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 5; and
- .3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

§ 8 If the Surety elects to act under Section 5.1, 5.3 or 5.4, the Surety's liability is limited to the amount of this Bond.

§ 9 The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors and assigns.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

#### § 14 Definitions

§ 14.1 **Balance of the Contract Price.** The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

§ 14.2 **Construction Contract.** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

§ 14.3 **Contractor Default.** Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

§ 14.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 14.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 15 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

Init.

§ 16 Modifications to this bond are as follows:

(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)

**CONTRACTOR AS PRINCIPAL**

**SURETY**

Company: \_\_\_\_\_ (Corporate Seal)

Company: \_\_\_\_\_ (Corporate Seal)

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

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

Name and Title: \_\_\_\_\_

Name and Title: \_\_\_\_\_

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

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

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**Payment Bond**

**CONTRACTOR:**  
*(Name, legal status and address)*

**SURETY:**  
*(Name, legal status and principal place of business)*

**OWNER:**  
*(Name, legal status and address)*

**CONSTRUCTION CONTRACT**  
Date:  
Amount: \$  
Description:  
*(Name and location)*

**BOND**  
Date:  
*(Not earlier than Construction Contract Date)*

Amount: \$  
Modifications to this Bond:  None  See Section 18

**CONTRACTOR AS PRINCIPAL**                      **SURETY**  
Company: *(Corporate Seal)*                      Company: *(Corporate Seal)*

Signature: \_\_\_\_\_                      Signature: \_\_\_\_\_  
Name and    Name and  
Title:    Title:

*(Any additional signatures appear on the last page of this Payment Bond.)*

*(FOR INFORMATION ONLY — Name, address and telephone)*

**AGENT or BROKER:**                                      **OWNER'S REPRESENTATIVE:**  
*(Architect, Engineer or other party:)*

**ADDITIONS AND DELETIONS:**  
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.

§ 2 If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.

§ 3 If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Section 13) of claims, demands, liens or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials or equipment furnished for use in the performance of the Construction Contract and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety.

§ 4 When the Owner has satisfied the conditions in Section 3, the Surety shall promptly and at the Surety's expense defend, indemnify and hold harmless the Owner against a duly tendered claim, demand, lien or suit.

§ 5 The Surety's obligations to a Claimant under this Bond shall arise after the following:

§ 5.1 Claimants, who do not have a direct contract with the Contractor,

- .1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
- .2 have sent a Claim to the Surety (at the address described in Section 13).

§ 5.2 Claimants, who are employed by or have a direct contract with the Contractor, have sent a Claim to the Surety (at the address described in Section 13).

§ 6 If a notice of non-payment required by Section 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Section 5.1.1.

§ 7 When a Claimant has satisfied the conditions of Sections 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:

§ 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and

§ 7.2 Pay or arrange for payment of any undisputed amounts.

§ 7.3 The Surety's failure to discharge its obligations under Section 7.1 or Section 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Section 7.1 or Section 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.

§ 8 The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Section 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 9 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.



§ 10 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to, or give notice on behalf of, Claimants or otherwise have any obligations to Claimants under this Bond.

§ 11 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 12 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Section 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 13 Notice and Claims to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.

§ 14 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 15 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

#### § 16 Definitions

§ 16.1 Claim. A written statement by the Claimant including at a minimum:

- .1 the name of the Claimant;
- .2 the name of the person for whom the labor was done, or materials or equipment furnished;
- .3 a copy of the agreement or purchase order pursuant to which labor, materials or equipment was furnished for use in the performance of the Construction Contract;
- .4 a brief description of the labor, materials or equipment furnished;
- .5 the date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
- .6 the total amount earned by the Claimant for labor, materials or equipment furnished as of the date of the Claim;
- .7 the total amount of previous payments received by the Claimant; and
- .8 the total amount due and unpaid to the Claimant for labor, materials or equipment furnished as of the date of the Claim.

§ 16.2 Claimant. An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 16.3 Construction Contract. The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

§ 16.4 **Owner Default.** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

§ 16.5 **Contract Documents.** All the documents that comprise the agreement between the Owner and Contractor.

§ 17 If this Bond is issued for an agreement between a Contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

§ 18 Modifications to this bond are as follows:

*(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)*

**CONTRACTOR AS PRINCIPAL**

**SURETY**

Company: \_\_\_\_\_ (Corporate Seal)

Company: \_\_\_\_\_ (Corporate Seal)

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

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

Name and Title: \_\_\_\_\_

Name and Title: \_\_\_\_\_

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

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

## Certificate of Substantial Completion

**PROJECT:** *(name and address)*  
0000

**CONTRACT INFORMATION:**  
Contract For: General Construction  
Date:

**CERTIFICATE INFORMATION:**  
Certificate Number:  
Date:

**OWNER:** *(name and address)*

**ARCHITECT:** *(name and address)*

**CONTRACTOR:** *(name and address)*

The Work identified below has been reviewed and found, to the Architect's best knowledge, information, and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated below is the date established by this Certificate.

*(Identify the Work, or portion thereof, that is substantially complete.)*

\_\_\_\_\_  
**ARCHITECT** *(Firm Name)*

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

\_\_\_\_\_  
**DATE OF SUBSTANTIAL COMPLETION**

### WARRANTIES

The date of Substantial Completion of the Project or portion designated above is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

*(Identify warranties that do not commence on the date of Substantial Completion, if any, and indicate their date of commencement.)*

### WORK TO BE COMPLETED OR CORRECTED

A list of items to be completed or corrected is attached hereto, or transmitted as agreed upon by the parties, and identified as follows:

*(Identify the list of Work to be completed or corrected.)*

The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first. The Contractor will complete or correct the Work on the list of items attached hereto within ( ) days from the above date of Substantial Completion.

Cost estimate of Work to be completed or corrected: \$0.00

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and other items identified below shall be as follows:

*(Note: Owner's and Contractor's legal and insurance counsel should review insurance requirements and coverage.)*

The Owner and Contractor hereby accept the responsibilities assigned to them in this Certificate of Substantial Completion:

\_\_\_\_\_  
**CONTRACTOR** *(Firm Name)*

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

\_\_\_\_\_  
**DATE**

\_\_\_\_\_  
**OWNER** *(Firm Name)*

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

\_\_\_\_\_  
**DATE**





# STEWART

STRONGER BY DESIGN

## GEOTECHNICAL ENGINEERING REPORT

### **North Granville Senior Center**

303 Oxford Street  
Stovall, North Carolina

November 10, 2023

# GEOTECHNICAL ENGINEERING REPORT

## North Granville Senior Center

303 Oxford Street  
Stovall, North Carolina

November 10, 2023

Prepared For:

### **Oakley Collier Architects**

109 Candlewood Road  
Rocky Mount, NC 27804

Prepared By:



**STEWART**  
5400 Old Poole Road  
Raleigh, NC 27610

Stewart Project No.: F23025.00

11/10/2023

DocuSigned by:

*Heather Hancock*

3409C94907FA477...

Heather Hancock, EI  
Graduate Engineer, Geotechnical



DocuSigned by:

*Donald W. Brown Jr.*  
C06817F5F770411...

Donald W. Brown Jr., PE, LEED AP  
Practice Leader | Geotechnical & Construction Services  
NC PE License No. 28422

Stewart License No. C-1051

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- Boring Location Diagram

**Appendix B**

- Boring Snapshot
- Boring Logs
- Boring Summary Table
- Legend to Soil Descriptions

**Appendix C**

- Site Photographs

## **1 EXECUTIVE SUMMARY**

Stewart has completed a geotechnical exploration for the proposed North Granville Senior Center at 303 Oxford Street in Stovall, North Carolina. This Executive Summary is provided as a brief overview of our geotechnical evaluation for the project and is not intended to replace more detailed information contained elsewhere in this report. A summary of our findings, opinions, and recommendations is provided below.

- The current plans for this project include the construction of a new one-story structure with a concrete slab-on-grade and an outdoor deck. Site improvements will include asphalt-paved parking and pickleball courts.
- A total of 11 soil test borings were performed for this geotechnical exploration. Soil test borings were advanced to approximate depths ranging from 10 feet to 40 feet below the existing grade.
  - The borings encountered a sutural topsoil layer that varied in thickness from approximately 3 inches to 18 inches. The deeper topsoil appeared to be cultivated soil.
  - The soils encountered below the topsoil layer consisted of native Piedmont residual soils with USCS soil classifications of Silty and Clayey SAND (SM and SC), Sandy and Clayey SILT (ML and MH), and Sandy Lean CLAY (CL).
  - Groundwater was not encountered in any of the borings.
  - Weathered rock lenses were encountered in three of the 11 borings at approximate depths of 4 feet and 7 feet below the current grade.
  - Rock was not encountered in any of the borings.
- For design, we recommend a Seismic Site Class D.
- Undercutting of the thickened surficial topsoil/cultivated soil will be necessary in portions of the site.
- The use of conventional spread footings and concrete slab-on-grade are recommended.

The owner/designer/contractor should not rely solely upon the summary above. This report should be read in its entirety prior to implementing the recommendations in the preparation of design and construction documents. Stewart should be retained to perform sufficient services to determine plan/specification compliance with the recommendations in this report.



## 2 PROJECT INFORMATION

### 2.1 Project Understanding

The current plans for this project include the construction of a new one-story senior center with a concrete slab-on-grade and an outdoor deck. The finished floor elevation (FFE) will be 465 feet, with foundation stem walls extending up from the current grades on the southeast corner of the building. No grading plans were available at the time of this report; therefore, for the purpose of our evaluation, we've assumed that grading will be minimal (less than 3 feet cut/fill).

Site improvements will include asphalt-paved parking for staff and visitors. The preliminary site plan also shows pickleball courts at the north end of the site.

### 2.2 Site Information

#### 2.2.1 Location

The site is located at 303 Oxford Street, in Stovall, North Carolina. Please refer to Figure A1 in Appendix A of this report for the site vicinity map.

#### 2.2.2 Current Conditions

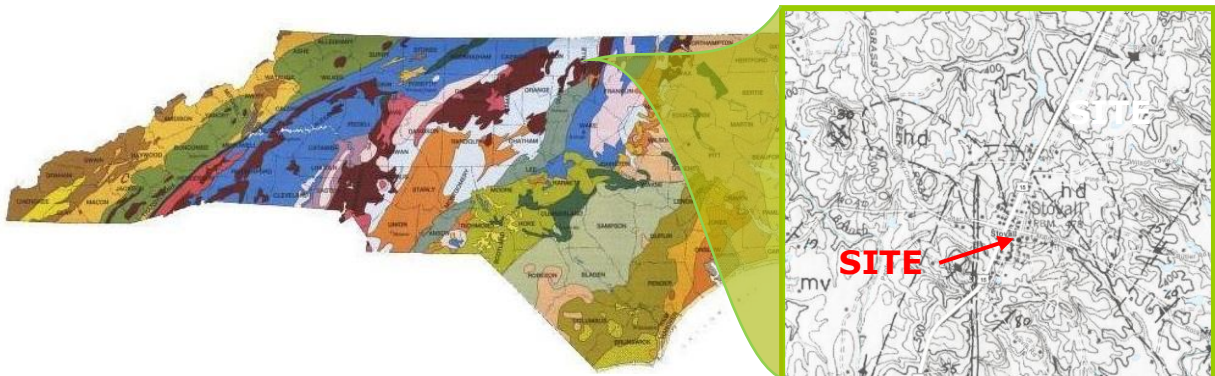
The subject site is currently a grass lot with brush and trees towards its center. The site is bound by Main Street to the north and Oxford Street to the west. The ground surface slopes gently downward from north to south with a relief of approximately 20 feet. Photographs taken during our time on site are included in Appendix C of this report.

#### 2.2.3 Past Conditions

Google aerial imagery shows that there was previously a house in the center of the site. The house was demolished sometime after 2019.

### 2.3 Geologic Area Overview

The project site is located in north Granville County, North Carolina, which lies within the Eastern Slate Belt of the Piedmont Geologic Province of North Carolina. Review of the *Geologic Map of the Oxford Quadrangle, Granville and Vance Counties, North Carolina (1974)* shows that the general area is underlain by felsic granodiorite (gf).



Based on our local experience, differential weathering of bedrock often results in highly variable subsurface conditions over relatively short horizontal and vertical distances. Furthermore, suspended boulders, discontinuous rock layers/lenses, rock pinnacles and/or zones of weathered and/or fractured rock are commonly encountered within the residual soils in this region.

### **3 SUBSURFACE EXPLORATION**

#### **3.1 Field Testing**

The subsurface conditions at the site were explored with 11 soil test borings (B-1 thru B-11). The boring layout is illustrated in Figures A2 in Appendix A of this report. The borings were advanced to depths ranging from approximately 10 feet to 40 feet. Drilling was performed by J&L Drilling of Four Oaks, NC using a truck-mounted CME 75 drill rig and 2¼-inch (ID) hollow-stem, continuous flight augers in general accordance with ASTM D6151.

Sampling operations were conducted in general accordance with ASTM D1586. At predetermined intervals, soil samples were obtained with a split-barrel sampler (standard 2-inch O.D.). The sampler was rested on the bottom of the borehole and driven to a penetration of 18 inches (or fraction thereof) with blows of a 140-pound manual drop hammer falling a distance of 30 inches. Of the 18 inches, the number of hammer blows required to achieve 6 inches of penetration is recorded for three consecutive segments. The sum of the blow counts for the second and third 6-inch segment is termed the Standard Penetration Test (SPT) resistance, or N-value. The N-values presented on the Boring Logs and Boring Snapshot are the actual field-recorded blow counts and do not include correction factors for hammer energy or overburden soil pressures.

All boreholes were backfilled with auger cuttings (soil) following groundwater measurements.

#### **3.2 Laboratory Services**

The soil samples obtained during the drilling operations were placed in labeled containers and transported to our laboratory where they were visually-manually classified and logged by a member of Stewart's geotechnical engineering staff in general accordance with ASTM D2488. Soil samples will be stored for two months before discarding.

#### **3.3 Subsurface Conditions**

The following is a subsurface description of a generalized nature, provided to highlight the major soil strata encountered. The stratification of the subsurface materials illustrated on the Boring Logs and Boring Snapshot represent the conditions at the actual test locations; therefore, variations should be expected between borings. Stratigraphy boundaries only represent the approximate depth/elevation of a noticed material change but the transition between material types is typically gradual. The soil types are based on the Unified Soil Classification System (USCS).

The ground surface elevation and coordinates at each boring location were surveyed by Stewart using a Carlson BRx7 GPS unit. The elevations are reported on the logs, rounded to the nearest 0.1-foot.

##### **3.3.1 Ground Cover**

A layer of organic-laden soil (topsoil), ranging in depth from approximately 7 inches to 18 inches, was encountered at the ground surface in all 11 borings. The thicker areas appeared to be cultivated soil with a blend of soils and some organic matter.

##### **3.3.2 Residual**

Residual soils are the undisturbed, weathered remains of the parent rock. Residual soil was encountered directly below the topsoil in all 11 borings and consisted of medium dense to very dense Silty SAND (SM), loose to medium dense Clayey SAND (SC), stiff to hard Sandy SILT (ML), medium stiff to very stiff Clayey SILT (MH), and soft to very stiff Sandy Lean CLAY (CL). SPT N-values in the residuum ranged from 7 to 76 bpf.

### 3.3.3 Weathered Rock

For engineering purposes, weathered rock (WR) is defined by SPT N-values of 100 blows per foot (bpf), or more commonly 50 blows with 6 inches or less penetration. Geologically, weathered rock is geomaterial that is structurally between the parent rock and soil. Weathered rock was encountered in the form of 1- to 4-foot thick lenses in borings B-1, B-3, and B-6 at a depths of approximately 7 feet (el. 459.4± feet), 4 feet (el. 456.8± feet), and 4 feet (461.7± feet) below the current ground surface, respectively.

### 3.3.4 Groundwater

Groundwater was not encountered in any of the borings at the time of drilling. Four borings (B-1, B-5, B-8, and B-9) were left open for 24± hours, after which groundwater was still not present in the borehole. All boreholes were backfilled with auger cuttings (soil) after groundwater measurements were complete.

The groundwater conditions represent the conditions at the time of the exploration. Fluctuations in groundwater levels are common and should be expected. Common factors that influence groundwater levels include, but are not limited to, soil stratification, climate/weather, nearby bodies of water (lakes, ponds, etc.), underground springs, streams, rivers and surface water discharge. At the onset, as well as continually throughout the construction process, the contractor should monitor groundwater levels if determined to be detrimental to the project.

## **4 ENGINEERING ASSESSMENT AND RECOMMENDATIONS**

### **4.1 Site Grading**

#### **4.1.1 Subgrade Preparation**

All vegetation, topsoil, root mat, 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. If encountered, any old foundations or utilities/conduits should be removed and backfilled with compacted structural fill soil.

Areas of the site to receive fill or directly support new construction should also be proofrolled with a tandem-axle dump truck weighing between 15 and 20 tons after densification effort. Proofrolling should occur prior to fill placement or after reaching final grade in cut areas 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. Once prepared, it is the contractor's responsibility to protect the prepared subgrade from degradation caused by wet weather and/or construction traffic.

Given the fine nature of the onsite soil, the exposed surface soils are likely to become unstable rapidly in the presence of excess moisture (water) and construction traffic loading. Therefore, 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.

#### **4.1.2 Structural Fill**

##### **4.1.2.1 Selection**

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 50 or less and a Plasticity Index (PI) of 25 or less, as determined by Atterberg Limits testing (ASTM D4318)

The CL, ML, SM and SC soils encountered onsite meet the LL/PI requirements above and are suitable for reuse as structural fill. We do not recommend the reuse of MH soils as structural fill.

##### **4.1.2.2 Moisture Conditioning**

The water content of the structural fill should be maintained within  $\pm 3\%$  of the material's optimum water content as determined by the Standard Proctor Compaction Test (ASTM D698); however, slight deviation from this can sometimes be tolerated depending on the grading plan and type of material being placed. Such deviation should be considered by the engineer representing the owner's material testing firm.

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 soil 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.

#### 4.1.2.3 Compaction

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:

- 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. 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).

## 4.2 Foundations

### 4.2.1 Design

Based on the provided maximum column and wall loads of 25 kips and 3 klf, respectively, and the site preparation recommendations provided in this report, we recommend the use of conventional shallow spread footings to support the proposed structure. For the design of foundations, we recommend the parameters provided in the Table 1.

Table 1: Spread Footing Design Parameters

Parameter	Value
Net Allowable Soil Bearing Capacity, psf	
Bearing in newly placed fill	3,000
Bearing in native residual soil	4,000
Minimum Bearing Depth, in.	18
Minimum Column Footing Width, in.	36
Minimum Wall Footing Width, in,	18
Estimated Post-Construction Settlement, in.	
Total	1 or less
Differential	½ or less
Moist Soil Unit Weight, pcf	115
Passive Earth Pressure Coefficient*	2.77
Ultimate Friction Factor (tan δ)	0.30
*We recommend that a safety factor of at least 1.5 be used to determine the soil's allowable passive resistance and the soil's allowable friction.	

#### 4.2.2 Construction

It is preferable for spread footing excavations to be performed using a bucket with a flat cutting edge (no teeth) to reduce disturbance of the exposed bearing soil. Regardless, footing bottoms should be tamped with a jumping-jack or sled compactor prior to the foundation inspection and placement of reinforcing steel. Footings should be clean of loose material and debris and protected from disturbance. This includes protection from surface water run-off and freezing. If water is allowed to accumulate within a footing excavation and soften the bearing soils, or if the bearing soils are allowed to freeze, the deficient soils should be removed from the excavation and rechecked by Stewart personnel prior to concrete placement. When concrete cannot be placed immediately, we recommend placing a mud-mat to protect the bearing soil.

Foundation bearing soils should be checked by Stewart during construction to verify satisfactory bearing conditions (i.e., materials and strength). This typically involves using a ½-inch diameter, T-handled probe rod for an overall qualitative assessment throughout the foundation excavations, followed by strategically placed hand auger borings and Dynamic Cone Penetrometer (ASTM STP-399) testing for quantitative evaluation. DCP testing should be performed in accordance with the ASTM and completed prior to stone, steel, or concrete placement. Unsuitable soil detected during this evaluation should be repaired as recommended by Stewart.

### **4.3 Slab-On-Grade**

#### 4.3.1 Design

The design of the concrete slab-on-grade should be based on Westergaard's modulus of subgrade reaction ( $k$ ). Based on the soil conditions encountered near the surface at the site, and the stone layer recommended below, we recommend using an effective value ( $k_{ef}$ ) of 120 pci for slab design. However, if the floor slab will be heavily loaded or the design is otherwise sensitive to "k", we recommend performing plate load testing in accordance with ASTM D1196 to allow site-specific refinement of the design k-value.

We recommend a minimum 4-inch base layer of washed No. 57 stone to provide uniform support and to provide a capillary break. We also recommend the installation of a vapor barrier as a measure of protection against water vapor intrusion into the building. Even when the groundwater table is relatively deep, omitting the vapor barrier could lead to water vapor transmission through the slab and cause damage flooring and/or cause elevated moisture levels within the structure. We recommend considering the use of a vapor barrier meeting ASTM E1745, which should be installed per the ACI guidelines (ACI 302.2R) and ASTM E1643.

It is important to point out that cracking of concrete is normal and should be expected. Proper jointing of slabs is paramount in the control of cracking. The American Concrete Institute (ACI) recommends a maximum panel size (in feet) equal to approximately three times the thickness of the slab (in inches) in both directions. Controlling the water-cement ratio of the concrete, particularly after batching, and including fiber reinforcement in the mix can also help reduce shrinkage cracking.

#### 4.3.2 Construction

After the pad is prepared, it should be evaluated by Stewart to identify any weak or excessively unstable areas that require repair. This is typically accomplished by proofrolling with heavy, rubber-tired equipment such as a tandem-axle dump truck. In confined areas that cannot be proofrolled with a dump truck, use of smaller rubber tire equipment, probing, and/or DCP testing should be considered.

#### 4.4 Seismic Design Considerations

Per the 2018 NC State Building Code, the design of a structure must consider dynamic forces resulting from seismic events, regardless of their likelihood of occurrence. As part of a generalized procedure to estimate seismic forces, the code assigns a Seismic Site Classification (letter designation of Class A through F) based on the subgrade soil/rock conditions within the upper 100 feet of the ground surface at the subject site. Based on the SPT N-values recorded for the borings, the site classifies as a Seismic Site Class "D"; however, given the soil conditions encountered, we believe that there is a reasonably good chance that supplemental shear wave velocity (SWV) testing would result in a site class improvement. If this would be beneficial to the project, Stewart can make arrangements to perform SWV as an add service.

The following bulleted items briefly discuss our qualitative assessments of the other seismic-related issues. Detailed quantitative analyses for these items were not included in our Scope of Work and are not considered necessary at this time given the development plans and the subsurface conditions encountered.

- Liquefaction Hazard – Risk level is low – The soils encountered were of sufficient fines content and/or density to render them not readily liquefiable during the design earthquake.
- Slope Stability – Risk level is low - Based on the grading plan, neither tall nor overly steep cut/fill slopes are planned for construction.
- Surface Rupture – Risk is low – No active faults underlie the site.

#### 4.5 Flexible (Asphalt) Pavement

##### 4.5.1 Design

Given the parking configuration for this development, we anticipate that the front parking lot will only support light-duty automobile traffic (e.g., passenger cars and pick-up trucks) - up to 500 cars per day. The main drive aisle will support truck traffic, including garbage trucks (assumed two per week) and delivery vehicles (assumed two per day). No tractor trailer or bus traffic was considered in our analyses.

Based on the assumed traffic noted above, an estimated CBR of 5, and the site preparation recommendations herein, we recommend the minimum asphalt pavement sections provided in Table 2 which are based on the standard 20-year design life and NCDOT/AASHTO design methodology.

Table 2: Minimum Asphalt Pavement Sections

Layer/Course	Thickness, in.	
	Light-duty (Front Lot & Stalls)	Heavy-duty (Drive Aisle)
Surface (S9.5B)	2	3*
Aggregate Base Course (ABC)	6	8

Notes:

- Modifications to City/State streets, shall comply with their applicable standards.
- Traffic frequency to be verified by project's civil engineer.

\* Two lifts required.

#### 4.5.2 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. Experience has shown that most pavement failures are caused by localized soft spots in the subgrade or inadequate drainage. Proofrolling observed by an experienced engineer or technician from Stewart will reduce the likelihood of weak spots in the subgrade.

We recommend proofrolling finished subgrades, as well as the subsequently placed stone base, with a tandem-axle dump truck weighing between 25 and 35 tons. Proofrolling should occur 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. If subgrades are exposed to precipitation or freezing temperatures prior to paving, the area should be re-proofrolled to verify its condition.

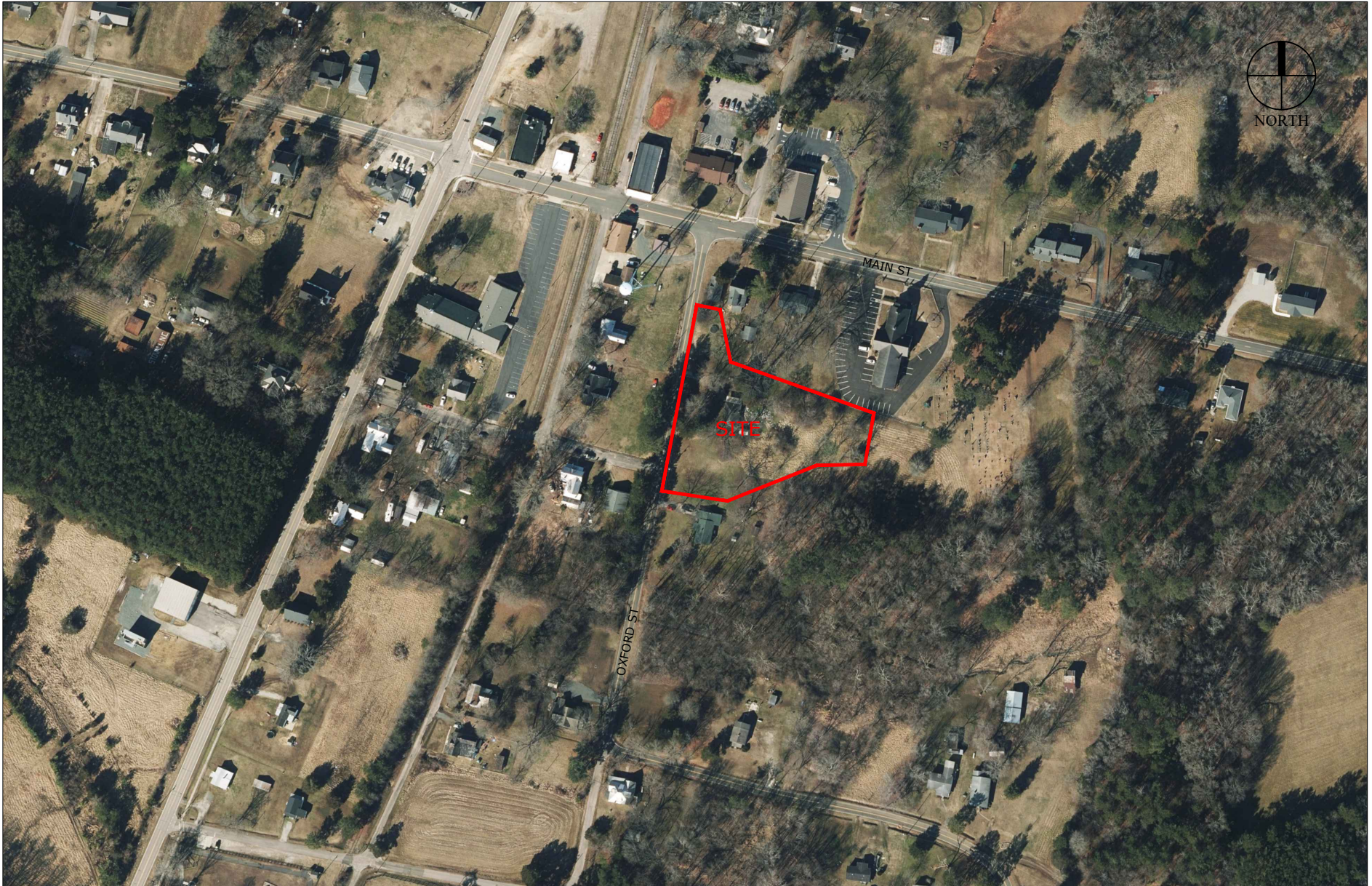
Aggregate base course stone should be compacted to at least 98 percent of its maximum dry density as determined by test method AASHTO T-180 (modified Proctor). Asphalt shall be placed with appropriate lift thicknesses and achieve the proper compaction for the mix(es) used, as specified in the latest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

The pavement sections provided herein do not account for construction traffic (dump trucks, concrete trucks, Lulls, etc.), which is typically very heavy. If construction traffic is allowed to operate on paved surfaces, damage and/or a shortened life cycle should be expected.



**APPENDIX A**

SITE VICINITY MAP  
BORING LOCATION DIAGRAM



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Note: All test locations are approximate (unless otherwise reported) and intended for illustration purposes only.

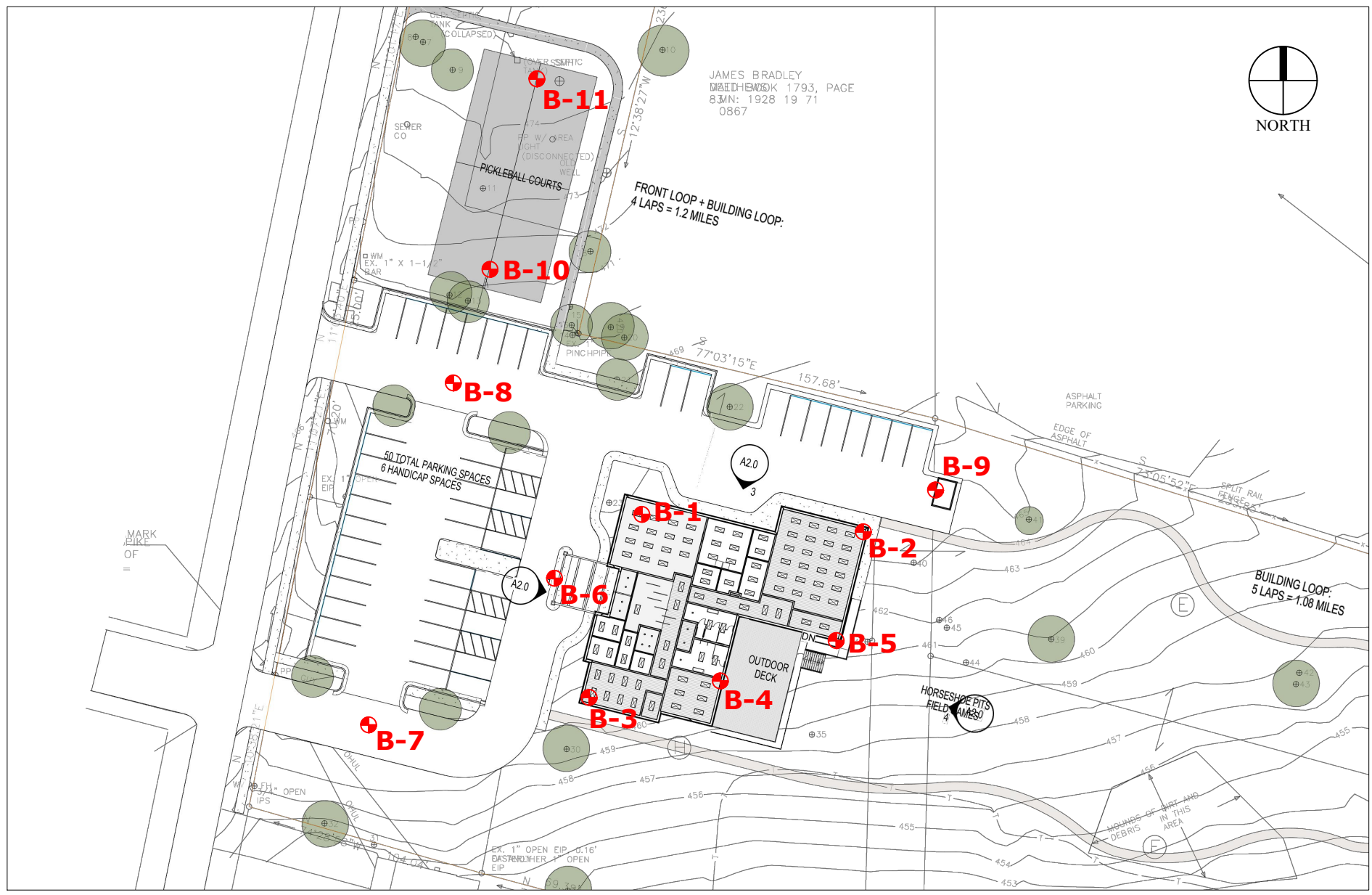


**SITE VICINITY MAP**  
**North Granville Senior Center**  
 303 Oxford Street  
 Stovall, North Carolina

Project No.:	F23025.00
Scale:	NTS
Prepared by:	HH
Date:	11-06-23

Figure No.:

**A1**



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Note: All test locations are approximate (unless otherwise reported) and intended for illustration purposes only.



**BORING LOCATION DIAGRAM**  
**North Granville Senior Center**  
 303 Oxford Street  
 Stovall, North Carolina

Project No.:	F23025.00
Scale:	1 in = 60 ft
Prepared by:	HH
Date:	11-06-23

Figure No.:

**A2**

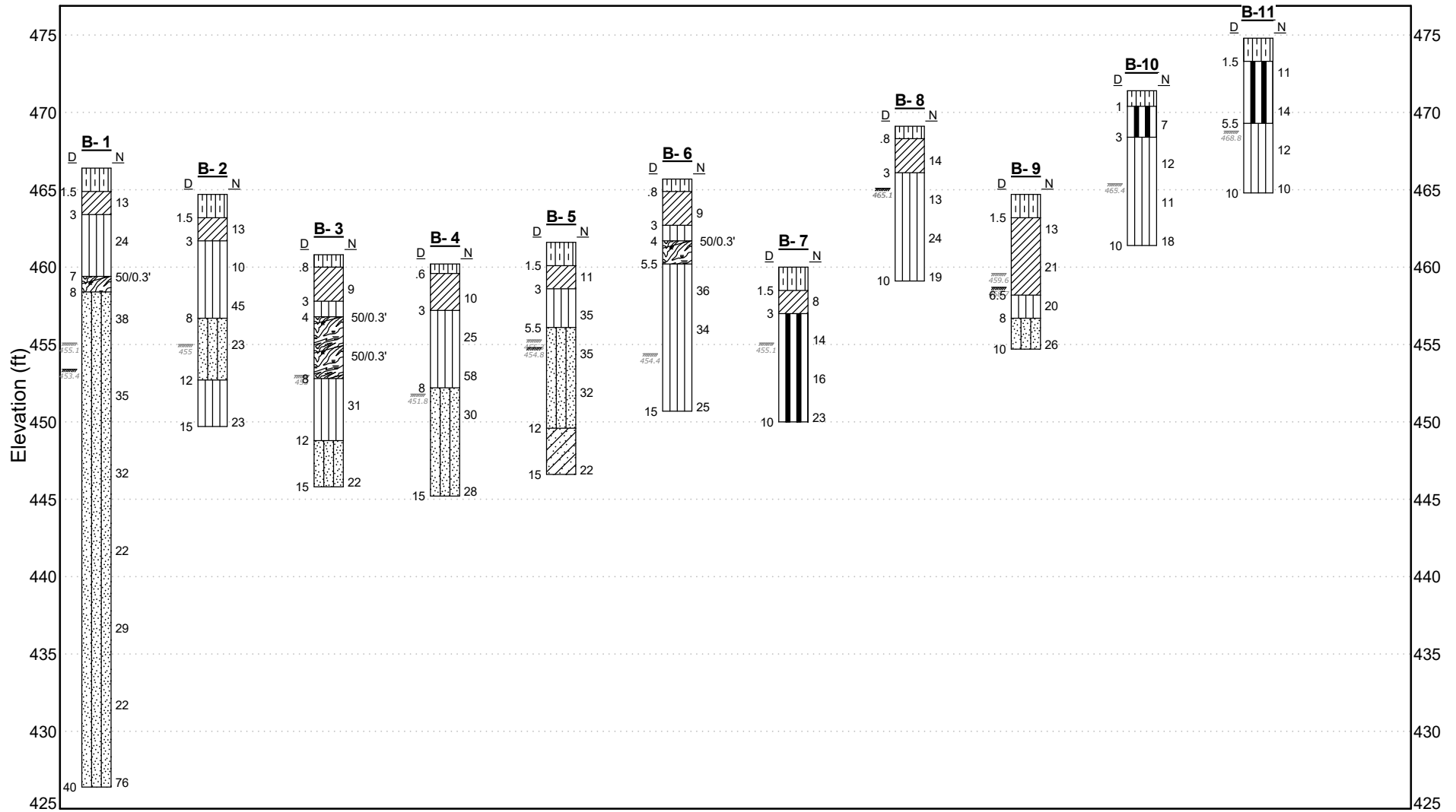
**APPENDIX B**

BORING SNAPSHOT  
BORING SUMMARY TABLE  
BORING LOGS  
LEGEND TO SOIL DESCRIPTIONS



STEWART

# BORING SNAPSHOT



The borings in this snapshot are arranged in alphabetical order and do not represent a profile or cross section of the subsurface conditions.

"D" Depth (ft), "N" SPT N-value (bpf)

### LITHOLOGY GRAPHICS

- Topsoil
- Lean Clay (CL)
- Silt (ML)
- Weathered Rock (WR)
- Silty Sand (SM)
- Clayey Sand (SC)
- Elastic Silt (MH)

**NORTH GRANVILLE SENIOR CENTER**  
STOVAL, NC

PROJECT NO.: F23025.00



# BORING SUMMARY TABLE

## STEWART

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

Borehole ID	Boring Depth (ft)	GSE (ft)	GW at 0 Hr		GW at 24+ Hr		Weathered Rock		Rock/Refusal		State Plane Coordinates	
			Depth (ft)	El. (ft)	Depth (ft)	El. (ft)	Depth (ft)	El. (ft)	Depth (ft)	El. (ft)	Northing	Easting
B- 1	40	466.4	DRY		DRY		7	459.4			981696.8052	2127003.817
B- 2	15	464.7	DRY		FIAD						981687.6054	2127093.412
B- 3	15	460.8	DRY		FIAD		4	456.8			981628.6276	2126971.957
B- 4	15	460.2	DRY		FIAD						981627.6268	2127022.56
B- 5	15	461.6	DRY		DRY						981648.3795	2127071.197
B- 6	15	465.7	DRY		FIAD		4	461.7			981687.2487	2126960.826
B- 7	10	460	DRY		FIAD						981608.5998	2126880.79
B- 8	10	469.1	DRY		DRY						981755.0652	2126917.147
B- 9	10	464.7	DRY		DRY						981706.4159	2127127.713
B-10	10	471.4	DRY		FIAD						981804.4514	2126933.592
B-11	10	474.8	DRY		FIAD						981881.7492	2126952.661

Note: Blank cells indicate not encountered or not measured/recorded. Refer to the individual boring log and report for additional details



# STEWART

## BORING LOG: B-1

PAGE 1 OF 2

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

DATE DRILLED 10/23/23 LOGGED BY H. HANCOCK

GROUND SURFACE EL. 466.4 FT BORING DEPTH 40 FT

DRILLING CONTRACTOR J&L DRILLING

0 HR GW DRY 0 HR CAVE-IN 11.3 FT

DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)

24± HR GW DRY 24± HR CAVE-IN 13 FT

DRILL RIG CME 75 HAMMER TYPE AUTO

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE DEPTH (ft)	SAMPLE TYPE	SAMPLE ID NUMBER	SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF)									
										10	20	30	40	50	60	70	80	90	
1.5	OL	<b>TOPSOIL</b> POSSIBLY CULTIVATED SOIL	464.9		1	SS	1	3											
3.0	CL	<b>RESIDUAL</b> STIFF, TAN AND BROWN, MOIST, SANDY LEAN CLAY	463.4		2.5	SS	1	6	13										
		VERY STIFF TO HARD, TAN, MOIST, SANDY SILT			3.5	SS	2	8											
	ML				5	SS	2	9	24										
7.0			459.4		6	SS	3	14											
8.0	WR	<b>WEATHERED ROCK (LENS)</b> TAN GRANODIORITE [SAMPLED AS SANDY SILT]	458.4		7.3	SS	3	23	50/0.3	50/0.3									
		MEDIUM DENSE TO VERY DENSE, TAN, MOIST TO WET, SILTY SAND WITH POCKETS OF FAT CLAY			8.5	SS	4	13											
					10	SS	4	16	38										
					13.5	SS	5	15											
					15	SS	5	16	35										
					18.5	SS	6	10											
					20	SS	6	13	32										
	SM				23.5	SS	7	8											
					25	SS	7	10	22										
					28.5	SS	8	10											
					30	SS	8	15	29										
					33.5	SS	9	8											
						SS	9	9											
						SS	9	13	22										

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

(Continued Next Page)



# STEWART

## BORING LOG: B-1

PAGE 2 OF 2

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

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
								PL ● WC LL	□ FINES CONTENT (%)
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
40.0	SM	MEDIUM DENSE TO VERY DENSE, TAN, MOIST TO WET, SILTY SAND WITH POCKETS OF FAT CLAY	426.4		38.5 SS 10	22 35 41	76		
BORING TERMINATED									

NOTE(S):  
GSE SURVEYED BY STEWART.





# STEWART

## BORING LOG: B-2

PAGE 1 OF 1

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

DATE DRILLED 10/23/23 LOGGED BY H. HANCOCK

GROUND SURFACE EL. 464.7 FT BORING DEPTH 15 FT

DRILLING CONTRACTOR J&L DRILLING

0 HR GW DRY 0 HR CAVE-IN 9.7 FT

DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)

BOREHOLE BACKFILLED IMMEDIATELY AFTER DRILLING

DRILL RIG CME 75 HAMMER TYPE AUTO

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE		SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF)									
					DEPTH (ft)	ID NUMBER			10	20	30	40	50	60	70	80	90	
1.5	OL	TOPSOIL POSSIBLY CULTIVATED SOIL	463.2		1	SS 1	4											
3.0	CL	RESIDUAL STIFF, TAN AND ORANGE, MOIST, SILTY LEAN CLAY	461.7		2.5	SS 1	5 8	13	▲									
		STIFF TO HARD, TAN AND BROWN, MOIST, SANDY SILT			3.5	SS 2	4 4 6	10	▲									
8.0	ML		456.7		6	SS 3	10 19 26	45		▲								
		MEDIUM DENSE, TAN, MOIST, SILTY SAND			8.5	SS 4	10 13 10	23		▲								
12.0	SM		452.7	455.0	10													
		VERY STIFF, TAN, WET, SANDY SILT			13.5	SS 5	9 9 14	23										
15.0	ML		449.7		15													

BORING TERMINATED

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



# STEWART

## BORING LOG: B-3

PAGE 1 OF 1

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

DATE DRILLED 10/24/23 LOGGED BY H. HANCOCK

GROUND SURFACE EL. 460.8 FT BORING DEPTH 15 FT

DRILLING CONTRACTOR J&L DRILLING

0 HR GW DRY 0 HR CAVE-IN 7.8 FT

DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)

BOREHOLE BACKFILLED IMMEDIATELY AFTER DRILLING

DRILL RIG CME 75 HAMMER TYPE AUTO

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	
								PL ● WC LL									
								10	20	30	40	50	60	70	80	90	
								□ FINES CONTENT (%)									
								10	20	30	40	50	60	70	80	90	
0.8	OL	TOPSOIL POSSIBLY CULTIVATED SOIL	460.0		1 SS 1	2 5 4											
3.0	CL	RESIDUAL STIFF, TAN, MOIST, SILTY LEAN CLAY	457.8		2.5 SS 1		9										
4.0	ML	VERY STIFF, TAN, MOIST, SANDY SILT	456.8		3.5 SS 2	25 50/0.3'	50/0.3'										
	WR	WEATHERED ROCK (LENS) TAN GRANODIORITE [SAMPLED AS SANDY SILT]			4.3 SS 2												
					6 SS 3	33 50/0.3'	50/0.3'										
8.0		HARD, TAN, MOIST, SANDY SILT	452.8		6.8 SS 3												
	ML				8.5 SS 4	13 15 16	31										
12.0			448.8		10 SS 4												
					13.5 SS 5	5 9 13	22										
15.0	SM	MEDIUM DENSE, TAN, MOIST, SILTY SAND	445.8		15 SS 5												

BORING TERMINATED



# STEWART

## BORING LOG: B-4

PAGE 1 OF 1

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

DATE DRILLED 10/24/23 LOGGED BY H. HANCOCK

GROUND SURFACE EL. 460.2 FT BORING DEPTH 15 FT

DRILLING CONTRACTOR J&L DRILLING

0 HR GW DRY 0 HR CAVE-IN 8.4 FT

DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)

BOREHOLE BACKFILLED IMMEDIATELY AFTER DRILLING

DRILL RIG CME 75 HAMMER TYPE AUTO

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	
								PL ● WC LL									
								10	20	30	40	50	60	70	80	90	
								□ FINES CONTENT (%)									
								10	20	30	40	50	60	70	80	90	
0.6	OL	TOPSOIL POSSIBLY CULTIVATED SOIL	459.6		1	2											
3.0	CL	RESIDUAL STIFF, TAN, MOIST, SILTY LEAN CLAY	457.2		2.5	4 6	10										
8.0	ML	VERY STIFF TO HARD, TAN, MOIST, SANDY SILT	452.2		3.5	9 11 14	25										
					6	14 27 31	58										
					7.5												
					8.5	10 13 17	30										
					10												
					13.5	11 12 16	28										
15.0	SM	MEDIUM DENSE, TAN, MOIST TO WET, SILTY SAND	445.2	451.8	15												

BORING TERMINATED

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



# STEWART

## BORING LOG: B-5

PAGE 1 OF 1

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

DATE DRILLED 10/23/23 LOGGED BY H. HANCOCK

GROUND SURFACE EL. 461.6 FT BORING DEPTH 15 FT

DRILLING CONTRACTOR J&L DRILLING

0 HR GW DRY 0 HR CAVE-IN 6.3 FT

DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)

24± HR GW DRY 24± HR CAVE-IN 6.8 FT

DRILL RIG CME 75 HAMMER TYPE AUTO

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	
								PL ● WC LL									
								10	20	30	40	50	60	70	80	90	
								□ FINES CONTENT (%)									
								10	20	30	40	50	60	70	80	90	
1.5	OL	<b>TOPSOIL</b> POSSIBLY CULTIVATED SOIL	460.1		1 SS 1	3 4											
3.0	CL	<b>RESIDUAL</b> STIFF, TAN AND RED, MOIST, SILTY LEAN CLAY	458.6		2.5 SS 1	7	11	▲									
		HARD, TAN, MOIST, SANDY SILT															
5.5	ML		456.1		3.5 SS 2	10 17 18	35										
		DENSE, TAN, MOIST, SILTY SAND															
					6 SS 3	9 15 20	35										
					7.5 SS 3												
					8.5 SS 4	12 15 17	32										
12.0	SM		449.6		10 SS 4												
		MEDIUM DENSE, TAN AND BROWN, WET, CLAYEY SAND															
15.0	SC		446.6		13.5 SS 5	9 10 12	22										
		BORING TERMINATED			15 SS 5												

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



# STEWART

## BORING LOG: B-6

PAGE 1 OF 1

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

DATE DRILLED 10/23/23 LOGGED BY H. HANCOCK

GROUND SURFACE EL. 465.7 FT BORING DEPTH 15 FT

DRILLING CONTRACTOR J&L DRILLING

0 HR GW DRY 0 HR CAVE-IN 11.3 FT

DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)

BOREHOLE BACKFILLED IMMEDIATELY AFTER DRILLING

DRILL RIG CME 75 HAMMER TYPE AUTO

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	
								PL ● WC LL									
								10	20	30	40	50	60	70	80	90	
								□ FINES CONTENT (%)									
								10	20	30	40	50	60	70	80	90	
0.8	OL	TOPSOIL	464.9														
	CL	RESIDUAL STIFF, TAN, MOIST, SILTY LEAN CLAY			1 SS 1	3 4 5	9										
3.0		HARD, TAN, MOIST, SANDY SILT	462.7		2.5												
4.0	ML		461.7		3.5 SS 2	42											
	WR	WEATHERED ROCK (LENS) TAN GRANODIORITE [SAMPLED AS SANDY SILT]	460.2		4.3	50/0.3	50/0.3										
5.5		VERY STIFF TO HARD, TAN, SANDY SILT			6 SS 3	10 17 19	36										
	ML				8.5 SS 4	12 15 19	34										
					13.5 SS 5	12 14 11	25										
15.0		BORING TERMINATED	450.7		15												

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



# STEWART

## BORING LOG: B-7

PAGE 1 OF 1

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

DATE DRILLED 10/24/23 LOGGED BY H. HANCOCK

GROUND SURFACE EL. 460 FT BORING DEPTH 10 FT

DRILLING CONTRACTOR J&L DRILLING

0 HR GW DRY 0 HR CAVE-IN 4.9 FT

DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)

BOREHOLE BACKFILLED IMMEDIATELY AFTER DRILLING

DRILL RIG CME 75 HAMMER TYPE AUTO

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE		SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF)									
					DEPTH (ft)	ID NUMBER			10	20	30	40	50	60	70	80	90	
1.5	OL	<b>TOPSOIL</b> POSSIBLY CULTIVATED SOIL	458.5		1	SS 1	2 4											
3.0	CL	<b>RESIDUAL</b> MEDIUM STIFF, TAN AND RED, MOIST, SANDY LEAN CLAY	457.0		2.5		4	8	▲									
		STIFF TO VERY STIFF, TAN, MOIST, CLAYEY SILT			3.5	SS 2	3 5 9	14	▲									
	MH				6	SS 3	5 6 10	16	▲									
					8.5	SS 4	4 8 15	23	▲									
10.0			450.0		10				▲									

BORING TERMINATED

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



# STEWART

## BORING LOG: B- 8

PAGE 1 OF 1

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

DATE DRILLED 10/23/23 LOGGED BY H. HANCOCK

GROUND SURFACE EL. 469.1 FT BORING DEPTH 10 FT

DRILLING CONTRACTOR J&L DRILLING

0 HR GW DRY 0 HR CAVE-IN 4 FT

DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)

24± HR GW DRY 24± HR CAVE-IN 4 FT

DRILL RIG CME 75 HAMMER TYPE AUTO

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
								PL ● WC LL	□ FINES CONTENT (%)
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
0.8	OL	TOPSOIL	468.3						
3.0	CL	RESIDUAL STIFF, TAN, MOIST, SANDY LEAN CLAY	466.1		1 2.5 SS 1	4 7 7	14	▲	
		STIFF TO VERY STIFF, TAN, MOIST, SANDY SILT	463.1		3.5 5 SS 2	6 5 8	13	▲	
					6 7.5 SS 3	7 10 14	24	▲	
10.0	ML		459.1		8.5 10 SS 4	7 9 10	19	▲	

BORING TERMINATED

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



# STEWART

## BORING LOG: B-9

PAGE 1 OF 1

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

DATE DRILLED 10/23/23 LOGGED BY H. HANCOCK

GROUND SURFACE EL. 464.7 FT BORING DEPTH 10 FT

DRILLING CONTRACTOR J&L DRILLING

0 HR GW DRY 0 HR CAVE-IN 5.1 FT

DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)

24± HR GW DRY 24± HR CAVE-IN 6 FT

DRILL RIG CME 75 HAMMER TYPE AUTO

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	
								PL ● WC LL									
								10	20	30	40	50	60	70	80	90	
								□ FINES CONTENT (%)									
								10	20	30	40	50	60	70	80	90	
1.5	OL	<b>TOPSOIL</b> POSSIBLY CULTIVATED SOIL	463.2		1 SS 1	5 5											
	CL	<b>RESIDUAL</b> STIFF TO VERY STIFF, TAN, RED AND GRAY, MOIST, SILTY LEAN CLAY			2.5	8	13										
						3.5	7 10										
						5	10 11	21									
6.5			458.2	459.6	6 SS 2	8 8											
	ML	VERY STIFF, TAN AND GRAY, MOIST, SANDY SILT			7.5	12	20										
8.0					456.7												
	SM	MEDIUM DENSE, TAN AND GRAY, MOIST, SILTY SAND			8.5	10 11 15											
10.0					454.7	10		26									

BORING TERMINATED

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





# STEWART

## BORING LOG: B-10

PAGE 1 OF 1

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

DATE DRILLED 10/24/23 LOGGED BY H. HANCOCK

GROUND SURFACE EL. 471.4 FT BORING DEPTH 10 FT

DRILLING CONTRACTOR J&L DRILLING

0 HR GW DRY 0 HR CAVE-IN 6 FT

DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)

BOREHOLE BACKFILLED IMMEDIATELY AFTER DRILLING

DRILL RIG CME 75 HAMMER TYPE AUTO

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
								PL ● WC LL	□ FINES CONTENT (%)
								10 20 30 40 50 60 70 80 90	10 20 30 40 50 60 70 80 90
1.0		TOPSOIL	470.4						
3.0	MH	RESIDUAL MEDIUM STIFF, RED, MOIST, CLAYEY SILT	468.4		1 SS 1	4 3 4	7	▲	
		STIFF TO VERY STIFF, RED AND TAN, MOIST, CLAYEY SANDY SILT			2.5 SS 2	4 5 7	12	▲	
	ML				5 SS 3	4 5 6	11	▲	
					6 SS 4	6 7 11	18	▲	
10.0		BORING TERMINATED	461.4		8.5 10			▲	

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



# STEWART

## BORING LOG: B-11

PAGE 1 OF 1

PROJECT NORTH GRANVILLE SENIOR CENTER

CLIENT OAKLEY COLLIER

LOCATION STOVALL, NC

PROJECT NO. F23025.00

DATE DRILLED 10/24/23 LOGGED BY H. HANCOCK

GROUND SURFACE EL. 474.8 FT BORING DEPTH 10 FT

DRILLING CONTRACTOR J&L DRILLING

0 HR GW DRY 0 HR CAVE-IN 6 FT

DRILLING METHOD HSA AUGER SIZE 2-1/4 INCH (ID)

BOREHOLE BACKFILLED IMMEDIATELY AFTER DRILLING
















DRILL RIG CME 75 HAMMER TYPE AUTO

DEPTH (ft)	MATERIAL TYPE	MATERIAL DESCRIPTION	ELEVATION (ft)	WL / CAVE EL (ft)	SAMPLE		SPT BLOW COUNTS	N-VALUE (bpf)	▲ SPT N-VALUE (BPF)												
					DEPTH (ft)	ID NUMBER			10	20	30	40	50	60	70	80	90				
1.5	OL	<b>TOPSOIL</b> POSSIBLY CULTIVATED SOIL	473.3		1	SS 1	3														
2.5	MH	<b>RESIDUAL</b> STIFF, RED, MOIST, CLAYEY SILT			2.5	SS 1	5	11	▲												
3.5		3.5			3.5	SS 2	4														
5.5	ML	STIFF, RED AND ORANGE, MOIST, SANDY SILT	469.3		5	SS 2	7	14	▲												
6		6			6	SS 3	5														
7.5					7.5	SS 3	4	12	▲												
8.5					8.5	SS 4	3														
10.0			464.8		10	SS 4	5	10	▲												


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	
		CLEAN SANDS <5% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL	
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL	
	SANDS  >50% OF COARSE FRACTION PASSES ON NO. 4. SIEVE	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	
		CLEAN SANDS <5% FINES	FINES CLASSIFY AS ML OR CL	SM	SILTY SAND	
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS CL OR CH	SC	CLAYEY 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	
		INORGANIC	$PI > 4$ AND PLOTS < "A" LINE	ML	LOW PLASTICITY SILT	
		ORGANIC	LL (oven dried)/LL (not dried) < 0.75	OL	ORGANIC CLAY OR SILT	
	SILTS AND CLAYS  LIQUID LIMIT >50	INORGANIC	$PI$ PLOTS > "A" LINE	CH	HIGH PLASTICITY (FAT) CLAY	
		INORGANIC	$PI$ 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)	 Fill - Clayey Sand (SC)
 Elastic Silt (MH)	 Silt (ML)
 Clayey Sand (SC)	 Silty Sand (SM)
 Topsoil	 Weathered Rock (WR)

**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

**ABBREVIATIONS & SYMBOLS**

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

SITE PHOTOGRAPHS

Site Photographs

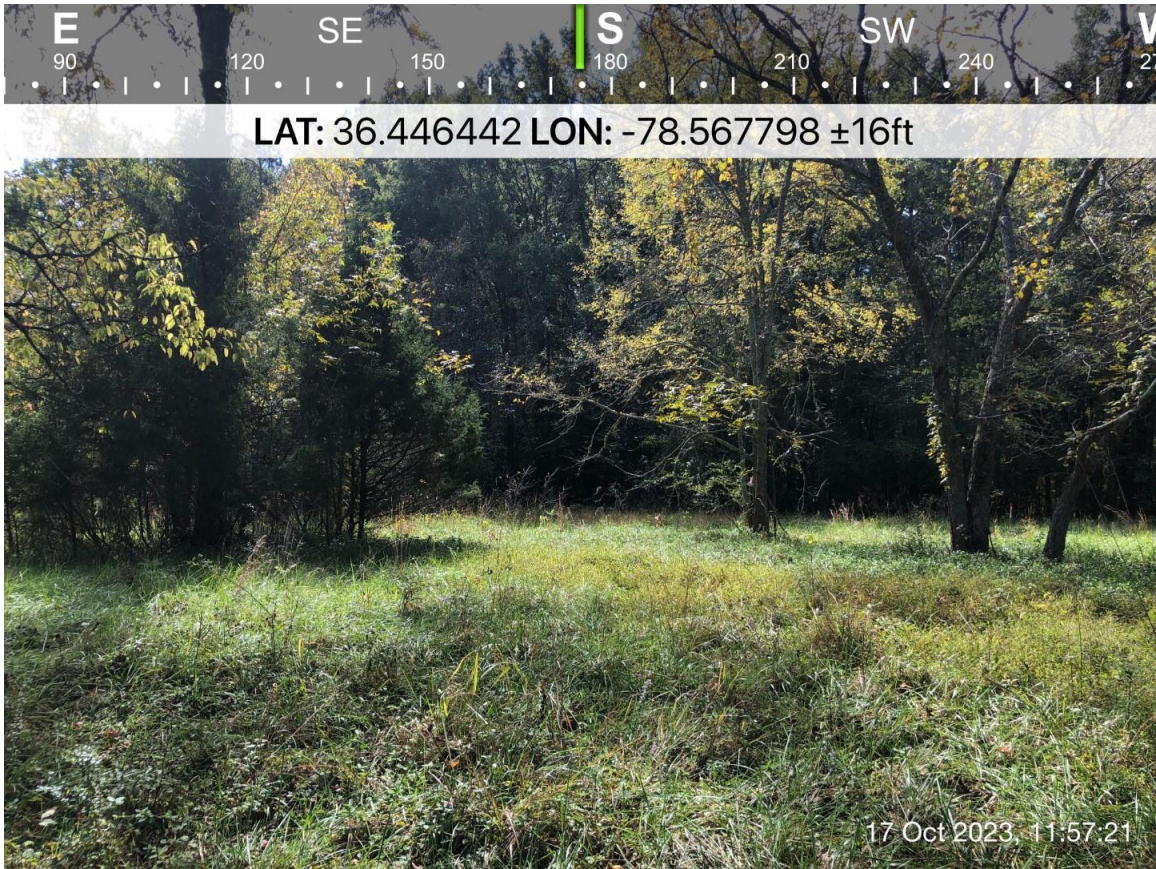


Photograph 1: Looking northeast towards borings B-1, B-2, and B-9.



Photograph 2: Looking north down Oxford Street towards borings B-8, B-10, and B-11.

Site Photographs



Photograph 3: General site conditions in the center of the site.



Photograph 4: Looking east towards boring B-6.

## Index of Drawings

G0.1	COVERSHEET
G0.2	BUILDING CODE SUMMARY
G1.1	LIFE SAFETY
CE-00	COVER SHEET
CE-01	DEMOLITION PLAN
CE-02	SITE and UTILITY PLAN
CE-03	DRAINAGE and GRADING PLAN
CE-04	EROSION CONTROL PLAN
D-01	EROSION NOTES/DETAILS
D-02	EROSION NOTES/DETAILS
D-03	NPDES SHEET
D-04	NPDES SHEET
D-05	SITE NOTES and DETAILS
D-06	SITE DETAILS
L1.1	LANDSCAPING PLAN
S0.1	GENERAL NOTES
S0.2	GENERAL NOTES
S0.3	ABBREVIATIONS AND SYMBOL LEGEND
S1.1	FOUNDATION PLAN
S1.2	ROOF FRAMING PLAN
S3.1	SLAB ON GRADE DETAILS
S3.2	FOUNDATION DETAILS
S4.1	CMU DETAILS
S6.1	METAL STUD AND TIMBER FRAMING DETAILS
S6.2	METAL STUD AND TIMBER FRAMING DETAILS
S6.3	METAL STUD AND TIMBER FRAMING DETAILS
S6.4	SHEAR WALL AND TIMBER FRAMING DETAILS
S6.5	ROOF DETAILS
S6.6	ROOF DETAILS
A1.1	FIRST FLOOR PLAN
A1.2	STEM WALL & DECK PLANS
A1.3	ATTIC PLAN
A1.4	ROOF PLAN
A1.5	REFLECTED CEILING PLAN
A1.7	FINISH PLAN
A1.9	ENLARGED PLANS
A2.0	OVERALL BUILDING ELEVATIONS
A3.1	BUILDING SECTIONS
A3.2	WALL SECTIONS
A5.1	DETAILS
A5.2	DETAILS - DECK

- A6.1 DOOR & WINDOW SCHEDULE
- A7.1 CASEWORK & INTERIOR ELEVATIONS
  
- P1.1 PLUMBING PLAN
- P1.2 ENLRGED PLUMBING PLANS
- P2.1 PLUMBING FIXTURE SCHEDULE AND DETAILS
- P2.2 PLUMBING DETAILS
- P2.3 PLUMBING NOTES, LEGEND, LOAD RISER AND DETAILS
  
- M1.1 MECHANICAL PLAN
- M1.2 MECHANICAL ATTIC PLAN
- M2.1 MECHANICAL NOTES, LEGEND, AND SCHEDULES
- M3.1 MECHANICAL DETAILS
  
- E1.1 POWER PLAN
- E1.2 LIGHTING PLAN
- E1.3 ELECTRICAL ATTIC PLAN
- E2.1 POWER RISER DIAGRAM PANEL SCHEDULES
- E2.2 FIXTURE SCHEDULE DETAILS
- E2.3 LEGEND NOTES



**SECTION 01 10 00  
SUMMARY****PART 1 GENERAL****1.01 PROJECT**

- A. Project Name: North Granville County Senior Center.
- B. Owner's Name: Granville County.
- C. Architect's Name: Oakley Collier Architects, PA.
- D. The Project includes the construction of a new, 8,714 square foot single story building including site development, plumbing, mechanical and electrical systems. The building includes a multipurpose room, dining room with adjacent kitchen, administrative area, craft room, fitness room and outside deck. Construction includes structural steel walls on a slab on grade with stem walls, fiber cement and stone veneer façade and a wood truss roof system.

**1.02 CONTRACT DESCRIPTION**

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

**1.03 WORK BY OWNER**

- A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before Substantial Completion.
- 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 Substantial Completion.
- 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.
  - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
- B. Arrange use of site 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. Limit disruption of utility services to hours the building is unoccupied.
  - 2. 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 electronic 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. 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. Provide the 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 21 00  
ALLOWANCES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Cash allowances.
- B. Payment and modification procedures relating to allowances.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 20 00 - Price and Payment Procedures: Additional payment and modification procedures.

**1.03 CASH ALLOWANCES**

- A. Costs Included in Cash Allowances: Cost of product to Contractor or subcontractor, less applicable trade discounts , less applicable taxes .
- B. Architect Responsibilities:
  - 1. Consult with Contractor for consideration and selection of products .
  - 2. Select products in consultation with Owner and transmit decision to Contractor.
- C. Contractor Responsibilities:
  - 1. Assist Architect in selection of products .
  - 2. Obtain proposals from suppliers and installers and offer recommendations.
  - 3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
  - 4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
  - 5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

**1.04 ALLOWANCES SCHEDULE**

- A. Allowance No. 1 - Architect's Contingency:
  - 1. Include in the base bid amount an allowance of \$100,000 for Architect's contingency. Contingency items shall be as determined and approved by the Architect and include all materials, labor, profit, and overhead associated with the approved contingency item.
- B. Unit Price No. 1 Allowance - Rock Excavation:
  - 1. The contractor shall stipulate the allowance amount to be included in the Base Bid for 500 cubic yards based on the description of work and unit of measurement cost provided for in Section 01 22 00 - Unit Prices, Unit Price No. 1.
- C. Unit Price No. 2 Allowance - Undercut/Fill in Trench Excavations.
  - 1. The contractor shall stipulate the allowance amount to be included in the Base Bid for 100 cubic yards based on the description of work and unit of measurement cost provided for in Section 01 22 00 - Unit Prices, Unit Price No. 2.
- D. Unit Price No. 3 Allowance - Undercut/Fill in Open Excavations.
  - 1. The contractor shall stipulate the allowance amount to be included in the Base Bid for 2,500 cubic yards based on the description of work and unit of measurement cost provided for in Section 01 22 00 - Unit Prices, Unit Price No. 3.
- E. Unit Price No. 4 Allowance - Data Outlet and Conduit.
  - 1. The contractor shall stipulate the allowance amount to be included in the Base Bid for 12 occurrences based on the description of work and unit of measurement cost provided for in Section 01 22 00 - Unit Prices, Unit Price No. 4.
- F. Unit Price No. 5 Allowance - Duplex Receptacle and Circuit.
  - 1. The contractor shall stipulate the allowance amount to be included in the Base Bid for 12 occurrences based on the description of work and unit of measurement cost provided for in Section 01 22 00 - Unit Prices, Unit Price No. 5.
- G. Unit Price No. 6 Allowance - Transformer Feeder.

1. The contractor shall stipulate the allowance amount to be included in the Base Bid for 200 linear feet of feeder from the transformer to the main service entrance equipment based on the description of work and unit of measurement cost provided for in Section 01 22 00 - Unit Prices, Unit Price No. 6.
- H. Unit Price No. 7 Allowance - Generator Feeder.
1. The contractor shall stipulate the allowance amount to be included in the Base Bid for 200 linear feet of feeder from the transformer to the generator based on the description of work and unit of measurement cost provided for in Section 01 22 00 - Unit Prices, Unit Price No. 7.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**



**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 -Rock Excavation:
  1. Description: Removal and disposal of materials and obstructions encountered subgrade and as further defined in Division 31 - Earthwork.
  2. Unit of Measurement: Cubic Yards Excavated.
- B. Item: Unit Price No. 2 - 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
- C. Item: Unit Price No. 3 - 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
- D. Item: Unit Price No. 4 - Data Outlet and Conduit.
  1. Description: Furnish and install data outlet and conduit to above ceiling in same configuration as delineated in the plans.
  2. Unit of Measurement: Per single outlet.
- E. Item: Unit Price No. 5 - Duplex Receptacle and Circuit.
  1. Description: Furnish and install duplex receptacle and circuit to panel in same configuration as delineated in the plans.
  2. Unit of Measurement: Per single outlet.
- F. Item: Unit Price No. 6 - Transformer Feeder.
  1. Description: The contractor shall stipulate the allowance amount to be included in the Base Bid for 200 linear feet of feeder from the transformer to the main service entrance to the building. Include alltrenching, duct bank, conduit, conductors, etc.
  2. Unit of Measurement: Per linear foot.
- G. Item: Unit Price No. 7 - Generator Feeder.
  1. Description: The contractor shall stipulate the allowance amount to be included in the Base Bid for 200 linear feet of feeder from the transformer to the generator. Include alltrenching, duct bank, conduit, conductors, etc.
  2. Unit of Measurement: Per linear foot.

#### **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.

**1.02 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.

**1.03 SCHEDULE OF ALTERNATES**

- A. Alternate No. G-1 - Outdoor Deck Canopy
  - 1. The contractor shall stipulate the sum to be added to the Base Bid for the installation of a canopy over the outdoor patio as detailed in the plans and specifications.
- B. Alternate No. G-2 - Kitchen 103 Floor Finish
  - 1. The contractor shall stipulate the sum to be added to the Base Bid for the installation of ceramic floor tile with tile base in lieu of LVT floor finish with rubber base in Kitchen 103 as detailed in the drawings and specifications.
- C. Alternate No. G-3 - Generator and Automatic Transfer Switch
  - 1. The contractor shall stipulate the sum to be added to the Base Bid for the installation of a generator and automatic transfer switch in lieu of a manual transfer switch as detailed in the electrical drawings.
- D. Alternate No. G-4 - Composite Decking
  - 1. The contractor shall stipulate the sum to be added to the Base Bid for the installation of composite decking as specified in the project manual on the outside deck, accompanying stairs and ramp in lieu of pressure treated lumber as detailed in the drawings.

**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 provide same or equivalent maintenance service and source of replacement parts, as applicable.
  4. 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.
  5. Waives claims for additional costs or time extension that may subsequently become apparent.
  6. 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) Warranties.
      - 6) Other salient features and requirements.
      - 7) Include, as appropriate or requested, the following types of documentation:
        - (a) Product Data:

- (b) Samples.
- (c) Certificates, test, reports or similar qualification data.
- (d) Drawings, when required to show impact on adjacent construction elements.
- 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 DURING PROCUREMENT**

- A. Submittal Time Restrictions:
  - 1. Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.

### **3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION**

- A. Architect will consider requests for substitutions only within 15 days after date of Agreement.
  - 1. Instruction to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.
- 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 within 14 days of 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 Contract Documents.

### **3.04 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.
  - 1. Architect's decision following review of proposed substitution will be noted on the submitted form.

### **3.05 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.

### **3.06 CLOSEOUT ACTIVITIES**

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

- B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

**END OF SECTION**

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**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. Requests for Interpretation (RFI) procedures.
- K. 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.
- B. Make the following types of submittals to Architect:
  - 1. Requests for Interpretation (RFI).
  - 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 Substantial Completion.
  - 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. Submission of initial Submittal schedule.
  - 6. Designation of personnel representing the parties to Contract, Owner and Architect.

7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  8. Scheduling.
  9. Scheduling activities of a Geotechnical Engineer.
- D. Architect will record minutes and distribute copies within two days after meeting to participants, with electronic copies to participants, and those affected by decisions made.

### 3.02 SITE MOBILIZATION MEETING

- A. Contractor will schedule 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. Contractor will record minutes and distribute copies within two days after meeting to participants, with electronic copies to participants, and those affected by decisions made.

### 3.03 PROGRESS MEETINGS

- A. Contractor will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required:
1. Contractor.
  2. Owner.
  3. Architect.
  4. Contractor's superintendent.
- C. Agenda:
1. Review minutes of previous meetings.
  2. Review of work progress.
  3. Field observations, problems, and decisions.
  4. Identification of problems that impede, or will impede, planned progress.
  5. Review of submittals schedule and status of submittals.
  6. Maintenance of progress schedule.
  7. Corrective measures to regain projected schedules.
  8. Planned progress during succeeding work period.
  9. Maintenance of quality and work standards.
  10. Effect of proposed changes on progress schedule and coordination.
  11. Other business relating to work.

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

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

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

### **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.
- 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 Substantial Completion.
  - 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.

### **3.07 REQUESTS FOR INTERPRETATION (RFI)**

- A. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  - 1. Prepare a separate RFI for each specific item.

- a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
- b. Do not forward requests which solely require internal coordination between subcontractors.
2. Prepare in a format and with content acceptable to Architect.
3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
  1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
  2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
    - a. Approval of submittals (use procedures specified elsewhere in this section).
    - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
    - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
    - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
  3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response.
  4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
  1. Official Project name and number, and any additional required identifiers established in Contract Documents.
  2. Owner's, Architect's, and Contractor's names.
  3. Discrete and consecutive RFI number, and descriptive subject/title.
  4. Issue date, and requested reply date.
  5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
  6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
  7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
  1. Indicate current status of every RFI. Update log promptly and on a regular basis.
  2. Note dates of when each request is made, and when a response is received.
  3. Highlight items requiring priority or expedited response.
  4. Highlight items for which a timely response has not been received to date.
- G. Review Time: Architect will respond and return RFIs to Contractor within fourteen calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
- H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

**3.08 SUBMITTAL SCHEDULE**

- A. Submit to Architect for review a schedule for submittals in tabular format.
  - 1. Submit at the same time as the preliminary schedule specified in Section - 01 32 16 - Construction Progress Schedule.
  - 2. Format schedule to allow tracking of status of submittals throughout duration of construction.
  - 3. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
  - 4. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
    - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

**3.09 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
  - 3. Samples for selection.
  - 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

**3.10 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:
  - 1. Design data.
  - 2. Certificates.
  - 3. Test reports.
  - 4. Inspection reports.
  - 5. Manufacturer's instructions.
  - 6. Manufacturer's field reports.
  - 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

**3.11 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- 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.

**3.12 NUMBER OF COPIES OF SUBMITTALS**

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

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

### 3.13 SUBMITTAL PROCEDURES

- A. General Requirements:
  - 1. Use a separate transmittal for each item.
  - 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
  - 3. Transmit using approved form.
    - a. Use Contractor's form, subject to prior approval by Architect.
  - 4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  - 5. 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.
    - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
  - 6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    - a. Send submittals in electronic format via email to Architect.
  - 7. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
    - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
    - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
  - 8. Provide space for Contractor and Architect review stamps.
  - 9. When revised for resubmission, identify all changes made since previous submission.
- 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. Samples Procedures:
  - 1. Transmit related items together as single package.
  - 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.

### 3.14 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.

1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. Architect's and consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "Approved", or language with same legal meaning.
    - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
      - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
    - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
  2. Not Authorizing fabrication, delivery, and installation:
    - a. "Revise and Resubmit".
      - 1) Resubmit revised item, with review notations acknowledged and incorporated.
    - b. "Rejected".
      - 1) Submit item complying with requirements of Contract Documents.
- E. Architect's and consultants' actions on items submitted for information:
1. Items for which no action was taken:
    - a. "Received" - to notify the Contractor that the submittal has been received for record only.
  2. Items for which action was taken:
    - a. "Reviewed" - no further action is required from Contractor.

**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 Architect 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 Substantial Completion.
- F. Submit reports required to support recommended changes.

**3.06 DISTRIBUTION OF SCHEDULE**

- A. Distribute copies of updated schedules to Contractor's project site file, to Subcontractors, suppliers, Architect, Architect , 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**



**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; 2024.
- 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; 2023.
- 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.
- G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.

**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.
- 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 Substantial Completion.
- 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 all specified testing except for Special Inspections.
- 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. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
  2. Inspection agency: Comply with requirements of ASTM D3740 and ASTM E329.
  3. Laboratory: Authorized to operate in the State in which the Project is located.
  4. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
  5. 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 Architect.

### 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 Architect 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. 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.
- C. 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.
- D. 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.
- E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency as original testing.
- F. 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.

**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.

**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.
  - 5. Mobile Device: One minimum.
- C. Contractor will pay for own telecommunications services.
- D. WiFi Access: Provide WiFi for use by Architect and Engineer until time of Substantial Completion.

**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 and to protect existing facilities and adjacent properties from damage from construction operations.

**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, and Contractor'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 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.

**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 REFERENCE STANDARDS**

- A. 29 CFR 1926 - Safety and Health Regulations for Construction; Current Edition.

**1.03 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.

**1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES**

- A. Provide and maintain LED, compact fluorescent, or high-intensity discharge lighting as suitable for the application for construction operations in accordance with requirements of 29 CFR 1926 and authorities having jurisdiction.
- B. Provide and maintain 1 watt/sq ft (10.8 watt/sq m) lighting to exterior staging and storage areas after dark for security purposes.
- 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.

**1.05 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.

**1.06 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.

**1.07 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.

**1.08 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 at completion of Work.
- 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 janitorial services for offices; periodic cleaning and maintenance for offices.
- 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. 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. Runoff Calculation Standard for Urban Areas: USDA TR-55.
- E. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.
- F. 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.
- 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 Substantial Completion.

### **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 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary: Responsibility to provide signs.

**1.03 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.

**1.04 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 each of construction, design, and content indicated on drawings, location to be designated by Architect.
  - 1. Job 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. Names and titles of Architect and Consultants.
  - 3. 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, and directional signs to direct traffic into and within site. 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.

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- 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 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.

**2.02 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
  - 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.

#### **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. See Section 01 74 19.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts.
- E. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

- F. For exterior storage of fabricated products, place on sloped supports above ground.
- G. Provide off-site storage and protection when site does not permit on-site storage or protection.
- H. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- I. Comply with manufacturer's warranty conditions, if any.
- J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- L. Prevent contact with material that may cause corrosion, discoloration, or staining.
- M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- N. 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 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 compliance 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.

**1.03 QUALIFICATIONS**

- A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,
- 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. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.

**1.04 PROJECT CONDITIONS**

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- C. Perform dewatering activities, as required, for the duration of the project.
- 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.

1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- 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.

### 1.05 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. 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, Design-Builder, 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 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Architect before disturbing existing installation.
  - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
  - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
  - 2. Remove items indicated on drawings.
  - 3. Relocate items indicated on drawings.
  - 4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
  - 5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Protect existing work to remain.
  - 1. Prevent movement of structure; provide shoring and bracing if necessary.
  - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
- D. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
  - 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
  - 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
  - 3. Where a change of plane of 1/4 inch (6 mm) or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
- E. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- F. Refinish existing surfaces as indicated:
  - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
  - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- G. Clean existing systems and equipment.
- H. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- I. Do not begin new construction in alterations areas before demolition is complete.
- J. Comply with all other applicable requirements of this section.

### 3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. 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-complying work.
- D. 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.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 00, to full thickness of the penetrated element.
- J. 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.

### **3.08 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.

### **3.09 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.

**3.10 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.

**3.11 DEMONSTRATION AND INSTRUCTION**

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

**3.12 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.

**3.13 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, 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.

**3.14 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
  - 1. Provide copies to Architect.
- B. Substantial Completion.
  - 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 Substantial Completion.
  - 2. Notify Architect when work is considered ready for Architect's Substantial Completion 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 Substantial Completion inspection.
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 punch list.
    - a. Contractor is responsible for completing his own punch list 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 Substantial Completion.
  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 Substantial Completion following inspection and correction of any deficiencies.
- C. Final Inspection/Acceptance.
1. Notify Architect when project is complete.
  2. Final inspection will not be scheduled until all contracts are completed unless approved otherwise or allowed by exception in General Conditions.
  3. Notify Architect that punch list items have been corrected and project is ready for a final formal inspection.
  4. Architect will certify in writing that all punch list items have been completed and schedule formal final inspection with the Owner.
  5. The Architect will furnish written notice of the final formal inspection not less than seven (7) days prior to the inspection.
  6. Architect will coordinate Final Formal inspection with all parties.
  7. 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. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

### 3.15 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 Substantial Completion 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**

**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. 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.
- D. 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.

**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 demolition, cutting and patching, installation, protection, and cleaning.

**END OF SECTION**

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**SECTION 01 78 00  
CLOSEOUT SUBMITTALS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Project record documents.
- B. Operation and maintenance data.
- C. 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. Architect 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 Final Acceptance or Beneficial Occupancy, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Final Acceptance or Beneficial Occupancy, 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 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed shop drawings, product data, and samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to finish first floor datum.

2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

### **3.02 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.

### **3.03 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.

### **3.04 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.

### **3.05 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. 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.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. 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.
- G. 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.
- H. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrangement of Contents: Organize each volume in parts as follows:
  - 1. Project Directory.
  - 2. Table of Contents, of all volumes, and of this volume.
  - 3. Operation and Maintenance Data: Arranged by system, then by product category.
    - a. Source data.
    - b. Product data, shop drawings, and other submittals.
    - c. Operation and maintenance data.
    - d. Field quality control data.
    - e. Photocopies of warranties and bonds.

### **3.06 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Final Acceptance or Beneficial Occupancy.
- 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. Landscape irrigation.
  - 6. 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 Contractor.
  - 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 Substantial Completion.
  - 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 Substantial Completion.

**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 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Form-facing material for cast-in-place concrete.
- 2. Form liners.
- 3. Shoring, bracing, and anchoring.

B. Related Requirements:

- 1. Section 321313 "Concrete Paving" for formwork related to concrete pavement and walks.

1.3 DEFINITIONS

- A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.
- B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review the following:

- a. Special inspection and testing and inspecting agency procedures for field quality control.
- b. Construction, movement, contraction, and isolation joints
- c. Forms and form-removal limitations.
- d. Shoring and reshoring procedures.
- e. Anchor rod and anchorage device installation tolerances.

## 1.5 ACTION SUBMITTALS

## A. Product Data: For each of the following:

1. Exposed surface form-facing material.
2. Concealed surface form-facing material.
3. Forms for cylindrical columns.
4. Form liners.
5. Form ties.
6. Waterstops.
7. Form-release agent.

## B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
4. Laboratory Test Reports: For liquid floor treatments and curing and sealing compounds, indicating compliance with requirements for low-emitting materials.

## C. Shop Drawings: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.

1. For exposed vertical concrete walls, indicate dimensions and form tie locations.
2. Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301.
  - a. Location of construction joints is subject to approval of the Architect.
3. Indicate location of waterstops.
4. Indicate form liner layout and form line termination details.
5. Indicate proposed schedule and sequence of stripping of forms, shoring removal, and reshoring installation and removal.

## 1.6 INFORMATIONAL SUBMITTALS

## A. Qualification Data: For testing and inspection agency.

## B. Research Reports: For insulating concrete forms indicating compliance with International Code Council Acceptance Criteria AC308.

## C. Field quality-control reports.

## D. Minutes of preinstallation conference.

## 1.7 QUALITY ASSURANCE

## A. Testing and Inspection Agency Qualifications: An independent agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Form Liners: Store form liners under cover to protect from sunlight.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

## PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
  - 1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
  - 2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.
- B. Design, engineer, erect, shore, brace, and maintain insulating concrete forms in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.
  - 1. Design cross ties to transfer the effects of the following loads to the cast-in-place concrete core:
    - a. Wind Loads: As indicated on Drawings.
      - 1) Horizontal Deflection Limit: Not more than 1/240 of the wall height.

## 2.2 FORM-FACING MATERIALS

- A. As-Cast Surface Form-Facing Material:
  - 1. Provide continuous, true, and smooth concrete surfaces.
  - 2. Furnish in largest practicable sizes to minimize number of joints.
  - 3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:
    - a. Plywood, metal, or other approved panel materials.
    - b. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
      - 1) APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
      - 2) APA Plyform Class I, B-B or better; mill oiled and edge sealed.

- B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.
  - 1. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class.
  - 1. Provide forms with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Form Liners:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Architectural Polymers, Inc.
    - b. Fitzgerald Formliners.
    - c. Sika Corporation.
    - d. Spec Formliners, Inc.
  - 2. Face Pattern: Smooth.

### 2.3 WATERSTOPS

- A. Flexible Rubber Waterstops: U.S. Army Corps of Engineers CRD-C 513, for embedding in concrete to prevent passage of fluids through joints, with factory fabricated corners, intersections, and directional changes.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Williams Products, Inc.
  - 2. Profile: Flat dumbbell with center bulb.
  - 3. Dimensions: 4 inches by 3/16 inch thick; nontapered.
- B. Flexible PVC Waterstops: U.S. Army Corps of Engineers CRD-C 572, for embedding in concrete to prevent passage of fluids through joints, with factory fabricate corners, intersections, and directional changes.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. BoMetals, Inc.
    - b. Sika Corporation.
    - c. Vinylex Waterstop & Accessories.
  - 2. Profile: Flat dumbbell with center bulb.

3. Dimensions: 4 inches by 3/16 inch thick; nontapered.
- C. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Carlisle Coatings & Waterproofing Inc.
    - b. CETCO, a Minerals Technologies company.
    - c. Concrete Sealants Inc.
    - d. Sika Corporation.
- D. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer-modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Adeka Corporation.
    - b. CETCO, a Minerals Technologies company.
    - c. GCP Applied Technologies Inc.
    - d. Sika Corporation.

## 2.4 RELATED MATERIALS

- A. 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.
- B. 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.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
  2. Form release agent for form liners shall be acceptable to form liner manufacturer.
- F. Form Ties: Factory-fabricated, removable or snap-off, glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF FORMWORK

- A. Comply with ACI 301.
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes.
- C. Limit concrete surface irregularities as follows:
  1. Surface Finish-1.0: ACI 117 Class D, 1 inch.
  2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch.
  3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch.
- D. Construct forms tight enough to prevent loss of concrete mortar.
  1. Minimize joints.
  2. Exposed Concrete: Symmetrically align joints in forms.
- E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
  1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
  2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  3. Install keyways, reglets, recesses, and other accessories, for easy removal.
- F. Do not use rust-stained, steel, form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.
  1. Provide and secure units to support screed strips
  2. Use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.
  1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
  2. Locate temporary openings in forms at inconspicuous locations.

- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.
- K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.
  - 1. Determine sizes and locations from trades providing such items.
  - 2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.
- L. Construction and Movement Joints:
  - 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
  - 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 3. Place joints perpendicular to main reinforcement.
  - 4. Locate joints for beams, slabs, joists, and girders in the middle third of spans.
    - a. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  - 6. Space vertical joints in walls as indicated on Drawings.
    - a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.
  - 1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
  - 2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.
- N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
4. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
5. Clean embedded items immediately prior to concrete placement.

### 3.3 INSTALLATION OF WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm.
1. Install in longest lengths practicable.
  2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
  3. Allow clearance between waterstop and reinforcing steel of not less than 2 times the largest concrete aggregate size specified in Section 033000 "Cast-In-Place Concrete."
  4. Secure waterstops in correct position at 12 inches on center.
  5. Field fabricate joints in accordance with manufacturer's instructions using heat welding.
    - a. Miter corners, intersections, and directional changes in waterstops.
    - b. Align center bulbs.
  6. Clean waterstops immediately prior to placement of concrete.
  7. Support and protect exposed waterstops during progress of the Work.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated on Drawings, according to manufacturer's written instructions, by adhesive bonding, mechanically fastening, and firmly pressing into place.
1. Install in longest lengths practicable.
  2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
  3. Protect exposed waterstops during progress of the Work.

### 3.4 REMOVING AND REUSING FORMS

- A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
  2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.



- B. Clean and repair surfaces of forms to be reused in the Work.
  - 1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
  - 2. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.
  - 1. Align and secure joints to avoid offsets.
  - 2. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.5 SHORING AND RESHORING INSTALLATION

- A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
  - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

END OF SECTION 031000

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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. BoMetals, Inc.: [www.bometals.com](http://www.bometals.com).
- C. Chaney Enterprises: [www.chaneyenterprises.com](http://www.chaneyenterprises.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 032000 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Steel reinforcement bars.
- 2. Welded-wire reinforcement.

B. Related Requirements:

- 1. Section 033816 "Unbonded Post-Tensioned Concrete" for reinforcing related to post-tensioned concrete.
- 2. Section 034100 "Precast Structural Concrete" for reinforcing used in precast structural concrete.
- 3. Section 321313 "Concrete Paving" for reinforcing related to concrete pavement and walks.

1.3 PREINSTALLATION MEETINGS

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

- 1. Review the following:

- a. Special inspection and testing and inspecting agency procedures for field quality control.
- b. Construction contraction and isolation joints.
- c. Steel-reinforcement installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

- 1. Each type of steel reinforcement.
- 2. Bar supports.
- 3. Mechanical splice couplers.

B. Sustainable Design Submittals:

- 1. Environmental Product Declaration: For each product.

2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M

B. Material Test Reports: For the following, from a qualified testing agency:

1. Steel Reinforcement:
  - a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.
2. Mechanical splice couplers.

C. Field quality-control reports.

D. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1. Store reinforcement to avoid contact with earth.

## PART 2 - PRODUCTS

### 2.1 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Post-consumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
- B. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.
- C. Low-Alloy Steel Reinforcing Bars: ASTM A706/A706M, deformed.
- D. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

### 2.2 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
  - 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
    - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- C. Mechanical Splice Couplers: ACI 318 Type 1, same material of reinforcing bar being spliced; tension-compression type.
- D. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.
  - 1. Finish: Plain.

### 2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

### 3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
2. Stagger splices in accordance with ACI 318.
3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.

G. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
  - a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.
2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

### 3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.



1. Place joints perpendicular to main reinforcement.
2. Continue reinforcement across construction joints unless otherwise indicated.
3. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

#### 3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117.

END OF SECTION 032000

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**SECTION 03 30 05  
MVRA FOR CAST-IN-PLACE CONCRETE****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Moisture vapor reducing admixture (MVRA) for cast-in-place concrete.

**1.02 REFERENCE STANDARDS**

- A. 302.2R-06 - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring.
- B. ACI 305R - Guide to Hot Weather Concreting; 2010.
- C. ACI 306R - Guide to Cold Weather Concreting; 2016.
- D. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019, with Editorial Revision (2022).
- E. ASTM D5084 - Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter; 2016a.
- F. 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.
- G. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017 (Reapproved 2023).

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Conduct a preinstallation meeting two weeks prior to the start of the work of this section; require attendance by all affected installers.
  - 1. Review and discuss:
    - a. MVRA project specific quality control procedures.
    - b. Concrete mix designs.
    - c. Procedures for ensuring quality of concrete materials.
    - d. Testing laboratory responsible for concrete design mixtures, sampling and testing.

**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 MVRA manufacturer approval of proposed concrete mix design.
- D. Material Certificate: Certify that products of this section meet or exceed specified requirements.
- E. Material Test Report: Document that products of this section comply with specified requirements.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
  - 1. Firm experienced in manufacture of concrete MVRA.
  - 2. Capable of providing test reports indicating compliance with specified performance requirements and with ASTM C494/C494M testing protocols, from independent AASHTO approved laboratory.
  - 3. Able to provide on-site technical assistance if requested.
- B. Ready Mixed Concrete Manufacturer Qualifications:
  - 1. Firm experienced in manufacturing ready-mixed concrete products.
  - 2. Comply with ASTM C94/C94M requirements for production facilities and equipment.
  - 3. Manufacturer certified according to NRMCA certification procedures.
- C. Slab Moisture Testing and Evaluation:
  - 1. Personnel performing laboratory tests: Certified in conduct of ASTM D5084 under supervision of licensed geotechnical engineer.

2. Determination of whether concrete slab is prepared to receive flooring, coatings, or roofing rests with MVRA manufacturer.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in original, undamaged containers with labels intact.
- B. Comply with manufacturer's written MVRA handling instructions prior to mixing.
- C. Comply with manufacturer's written MVRA storage instructions.

#### **1.07 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide manufacturer's lifetime warranty against concrete induced moisture vapor failure, providing coverage for:
  1. Repair or removal of failed flooring or roofing.
  2. Placement of topical moisture remediation system.
  3. Replacement of flooring or roofing materials to match original including material and labor.
- C. Provide manufacturer's adhesion warranty, matching terms of adhesive or primer manufacturer's material adhesion warranty.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. ISE Logik Industries, Inc: [www.iselogik.com](http://www.iselogik.com).
  1. MVRA 900 Basis of Design or approved substitution.
- B. Specialty Products Group: [www.spggogreen.com](http://www.spggogreen.com).
  1. Vapor Lock 20/20.
- C. Bone Dry Products, Inc: [www.bonedryproducts.com](http://www.bonedryproducts.com).
  1. Bone Dry Pro Admix.
- D. Barrier One: [www.barrierone.com](http://www.barrierone.com).
  1. MVRA CPS.
- E. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 MOISTURE VAPOR REDUCING ADMIXTURE**

- A. Concrete Moisture Vapor Reduction Admixture (MVRA):
  1. Physical characteristics:
    - a. Toxicity: None.
    - b. Odor: None.
    - c. Flammability: None.
    - d. Volatile Organic Compound (VOC) content: 0 grams per liter.
    - e. Freeze temperature: 32 degrees F (0 degrees C).
- B. Product: MVRA 900 by ISE Logik Industries Basis of Design or approved substitution.

#### **2.03 ACCESSORY MATERIALS**

- A. Underslab Vapor Retarder: See Section 07 26 00.

#### **2.04 MIXING**

- A. Moisture Vapor Reducing Admixture (MVRA) for new concrete, slabs below grade, slabs on grade, elevated slabs, roof deck, stair treads and landings, and exterior balconies.
- B. Add MVRA to concrete mix in accordance with manufacturer's instructions.
- C. Add MRVA directly to freshly mixed concrete at end of the batch process with tail water.
- D. Ready-Mixed Concrete:
  1. Measure, batch, mix, and deliver concrete with MVRA in accordance with ASTM C94/C94M.
  2. Furnish batch ticket information showing dosage of MVRA.
- E. Site Mixing:

1. Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M.
  2. Add MVRA where it makes direct contact with ready mix, then rotate drum of batch truck on high for at least seven minutes prior to discharge.
- F. Freshening onsite with held back mix water is acceptable if in accordance with ACI guidelines and if amount does not exceed original water to cementitious material ratio or instructions of Structural Engineer.
- G. Use water reducing admixtures to achieve desired slump.
- H. Use of other admixtures in same batch as MVRA is acceptable if each admixture is added separately.
- I. Do not use shrink reducing admixtures.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Dispense MVRA according to mix design and supplier's written instructions.
- B. Add MVRA to concrete according to manufacturer's written instructions.
- C. Place and cure concrete as specified in Section 03 30 00.

#### **3.02 CURING**

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306R-10 for cold-weather protection and ACI 305R-10 for hot-weather protection during curing.
- B. Cure concrete slabs to receive moisture sensitive coatings according to ACI 302.2R-06 by one or more of following methods:
  1. Moisture-retaining cover curing.
  2. Self-dissipating curing compound.

#### **3.03 FIELD QUALITY CONTROL**

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. MVRA Manufacturer: Pre-test manufactured production lots for conformance with published limits of hydraulic conductivity per ASTM D5084 prior to shipping.
- C. Project specific quality control process required by MVRA manufacturer necessary to convey concrete moisture vapor emission flooring failure warranty and stand-alone adhesion warranty.
- D. Project team: Upon request, provide batch tickets indicating presence and dosage of MVRA in mix.

**END OF SECTION**

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

- 1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
- 2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
- 3. Section 312000 "Earth Moving" for drainage fill under slabs-on-ground.
- 4. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with fly ash.

- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. 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. Special inspection and 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. Forms and form-removal limitations.
- j. Shoring and reshoring procedures.
- k. Methods for achieving specified floor and slab flatness and levelness.
- l. Floor and slab flatness and levelness measurements.
- m. Concrete repair procedures.
- n. Concrete protection.
- o. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
- p. Protection of field cured field test cylinders.

## 1.5 ACTION SUBMITTALS

### A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures:
  - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
5. Vapor retarders.
6. Floor and slab treatments.
7. Liquid floor treatments.
8. Curing materials.
9. Joint fillers.
10. Repair materials.

### B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
4. Laboratory Test Reports: For liquid floor treatments and curing and sealing compounds, indicating compliance with requirements for low-emitting materials.

### C. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.



2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

D. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
  - a. Location of construction joints is subject to approval of the Engineer of Record.

E. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

## 1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.
5. Bonding agents.
6. Adhesives.
7. Vapor retarders.
8. Semirigid joint filler.
9. Joint-filler strips.

10. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Aggregates.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Minutes of preinstallation conference.

#### 1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Finisher/Technician.

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

#### 1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

#### 1.9 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. 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.
3. Do not use frozen materials or materials containing ice or snow.

4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

## PART 2 - PRODUCTS

### 2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

### 2.2 CONCRETE MATERIALS

- A. Regional Materials: Concrete shall be manufactured within 100 miles of Project site from aggregates and cementitious materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site.

B. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

C. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I/II, gray.
2. Fly Ash: ASTM C618, Class C or F.

- D. Normal-Weight Aggregates: ASTM C33/C33M, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

- a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
- b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.

- c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.
  2. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
  3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- E. Lightweight Aggregate: ASTM C330/C330M, 3/4-inch nominal maximum aggregate size.
- F. Air-Entraining Admixture: ASTM C260/C260M.
- G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
  2. Retarding Admixture: ASTM C494/C494M, Type B.
  3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
  5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
  6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- H. Water and Water Used to Make Ice: ASTM C94/C94M, potable.

### 2.3 VAPOR RETARDERS

- A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Barrier-Bac; Intoplast Group.
    - b. ISI Building Products.
    - c. Poly-America, L.P.
    - d. Reef Industries, Inc.
    - e. Stego Industries, LLC.
    - f. Tex-Trude.
    - g. W.R. Meadows, Inc.

### 2.4 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. BASF Corporation.
  - b. ChemMasters, Inc.
  - c. ChemTec International.
  - d. Concrete Sealers USA.
  - e. Dayton Superior.
  - f. Euclid Chemical Company (The); an RPM company.
  - g. Kaufman Products, Inc.
  - h. Laticrete International, Inc.
  - i. Nox-Crete Products Group.
  - j. PROSOCO, Inc.
  - k. SpecChem, LLC.
  - l. US SPEC, Division of US MIX Company.
  - m. Vexcon Chemicals Inc.
  - n. V-Seal Concrete Sealers & Specialty Coatings.
  - o. W.R. Meadows, Inc.
2. 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."

## 2.5 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. BASF Corporation.
    - b. Bon Tool Co.
    - c. ChemMasters, Inc.
    - d. Dayton Superior.
    - e. Euclid Chemical Company (The); an RPM company.
    - f. Kaufman Products, Inc.
    - g. Lambert Corporation.
    - h. Laticrete International, Inc.
    - i. Metalcrete Industries.
    - j. Nox-Crete Products Group.
    - k. Sika Corporation.
    - l. SpecChem, LLC.
    - m. TK Products.
    - n. Vexcon Chemicals Inc.
    - o. W.R. Meadows, Inc.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
1. Color:
    - a. Ambient Temperature Below 50 deg F: Black.
    - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.

- c. Ambient Temperature Above 85 deg F: White.
- C. Water: Potable or complying with ASTM C1602/C1602M.
- D. Clear, Waterborne, Membrane-Forming, Non-dissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Anti-Hydro International, Inc.
    - b. BASF Corporation.
    - c. ChemMasters, Inc.
    - d. Dayton Superior.
    - e. Euclid Chemical Company (The); an RPM company.
    - f. Kaufman Products, Inc.
    - g. Lambert Corporation.
    - h. Laticrete International, Inc.
    - i. Metalcrete Industries.
    - j. Nox-Crete Products Group.
    - k. SpecChem, LLC.
    - l. TK Products.
    - m. Vexcon Chemicals Inc.
    - n. W.R. Meadows, Inc.
- E. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. ChemMasters, Inc.
    - b. Concrete Sealers USA.
    - c. Dayton Superior.
    - d. Euclid Chemical Company (The); an RPM company.
    - e. Kaufman Products, Inc.
    - f. Lambert Corporation.
    - g. Laticrete International, Inc.
    - h. Metalcrete Industries.
    - i. Nox-Crete Products Group.
    - j. Right Pointe.
    - k. SpecChem, LLC.
    - l. TK Products.
    - m. Vexcon Chemicals Inc.
    - n. W.R. Meadows, Inc.
  2. 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."

## 2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.
- C. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

## 2.7 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
  - 4. Compressive Strength: Not less than 4,100 psi at 28 days when tested in accordance with ASTM C109/C109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
  - 4. Compressive Strength: Not less than 5,000 psi at 28 days when tested in accordance with ASTM C109/C109M.

## 2.8 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
  - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

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, concrete for parking structure slabs, and concrete with a w/cm below 0.50.

## 2.9 CONCRETE MIXTURES

A. Class A: Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: ACI 318 F0, S0, W0, C0.
2. Minimum Compressive Strength: 3,000 psi at 28 days.
3. Maximum w/cm: 0.55.
4. Slump Limit: 4 inches, plus or minus 1 inch, before adding high-range water-reducing or plasticizing admixtures at the Project site (8 inches, plus or minus 1 inch thereafter).
5. Air Content: 2.0 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4 inch nominal maximum aggregate size.
6. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

B. Class C: Normal-weight concrete used for interior slabs-on-ground.

1. Exposure Class: ACI 318 F0, S0, W0, C0.
2. Minimum Compressive Strength: 3,000 psi at 28 days.
3. Maximum w/cm: 0.55.
4. Minimum Cementitious Materials Content: 540 lb/cu. yd.
5. Slump Limit: 4 inches, plus or minus 1 inch, before adding high-range water-reducing or plasticizing admixtures at the Project site (8 inches, plus or minus 1 inch thereafter).
6. Air Content: Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.
7. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

C. Class F: Normal-weight concrete used for exterior slabs-on-ground, concrete toppings/pads over slabs-on-ground, exterior pads, and balcony topping slabs.

1. Exposure Class: ACI 318 F2, S0, W1, C0.
2. Minimum Compressive Strength: 4,500 psi at 28 days.
3. Maximum w/cm: 0.45.
4. Minimum Cementitious Materials Content: 540 lb/cu. yd.
5. Slump Limit: 4 inches, plus or minus 1 inch.
6. Air Content:
  - a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch nominal maximum aggregate size.



7. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.
- D. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verification of Conditions:
1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
  2. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
1. Daily access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
  4. Security and protection for test samples and for testing and inspection equipment at Project site.

#### 3.3 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
  3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

## 3.4 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
  2. Face laps away from exposed direction of concrete pour.
  3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
  4. Lap joints 6 inches and seal with manufacturer's recommended tape.
  5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
  6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
  7. Protect vapor retarder during placement of reinforcement and concrete.
    - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

## 3.5 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by the Engineer of Record.
  2. Place joints perpendicular to main reinforcement.
    - a. Continue reinforcement across construction joints unless otherwise indicated.
    - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
  3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  6. Space vertical joints in walls as indicated on Drawings. Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
  7. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.

- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
  2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints:
1. Install dowel bars and support assemblies at joints where indicated on Drawings.
  2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

### 3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
  2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Engineer of Record and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer of Record in writing, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
1. If a section cannot be placed continuously, provide construction joints as indicated.
  2. Deposit concrete to avoid segregation.

3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
    - a. Do not use vibrators to transport concrete inside forms.
    - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    - d. 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.
- F. 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. Do not place concrete floors and slabs in a checkerboard sequence.
  2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  3. Maintain reinforcement in position on chairs during concrete placement.
  4. Screed slab surfaces with a straightedge and strike off to correct elevations.
  5. Level concrete, cut high areas, and fill low areas.
  6. Slope surfaces uniformly to drains where required.
  7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
  8. Do not further disturb slab surfaces before starting finishing operations.

### 3.7 FINISHING FORMED SURFACES

#### A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
  - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
  - b. Remove projections larger than 1 inch.
  - c. Tie holes do not require patching.
  - d. Surface Tolerance: ACI 117 Class D.
  - e. Apply to concrete surfaces not exposed to public view.
2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
  - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
  - b. Remove projections larger than 1/4 inch.
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 Class B.
  - e. Locations: Apply to concrete surfaces as indicated.
3. ACI 301 Surface Finish SF-3.0:

- a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
  - b. Remove projections larger than 1/8 inch.
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 Class A.
  - e. Locations: Apply to concrete surfaces as indicated.
- B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:
1. Smooth-Rubbed Finish:
    - a. Perform no later than one day after form removal.
    - b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
    - c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.
    - d. Maintain required patterns or variances as shown on Drawings or to match field sample panels.
  2. Grout-Cleaned Rubbed Finish:
    - a. Clean concrete surfaces after contiguous surfaces are completed and accessible.
    - b. Do not clean concrete surfaces as Work progresses.
    - c. Mix 1 part portland cement to 1-1/2 parts fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
    - d. Wet concrete surfaces.
    - e. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap, and keep surface damp by fog spray for at least 36 hours.
    - f. Maintain required patterns or variances as shown on Drawings or to match field sample panels.
  3. Cork-Floated Finish:
    - a. Mix 1 part portland cement to 1 part fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint.
    - b. Mix 1 part portland cement and 1 part fine sand with sufficient water to produce a mixture of stiff grout. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
    - c. Wet concrete surfaces.
    - d. Compress grout into voids by grinding surface.
    - e. In a swirling motion, finish surface with a cork float.
    - f. Maintain required patterns or variances as shown on Drawings or to match field sample panels.
  4. Scrubbed Finish: After concrete has achieved a compressive strength of from 1,000 to 1,500 psi, apply scrubbed finish.

- a. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed.
- b. Rinse scrubbed surfaces with clean water.
- c. Maintain continuity of finish on each surface or area of Work.
- d. Remove only enough concrete mortar from surfaces to match field sample panels.

C. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.8 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
3. Apply scratch finish to surfaces to receive concrete floor toppings and to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 (ACI A117M) tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.

6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:
  - a. Slabs on Ground:
    - 1) Specified overall values of flatness,  $F_F$  35; and of levelness,  $F_L$  25; with minimum local values of flatness,  $F_F$  24; and of levelness,  $F_L$  17.
  - b. Suspended Slabs:
    - 1) Specified overall values of flatness,  $F_F$  35; and of levelness,  $F_L$  20; with minimum local values of flatness,  $F_F$  24; and of levelness,  $F_L$  15. Levelness requirements may be waived for slabs on metal deck.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.
  1. Coordinate required final finish with Architect before application.
  2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.
  1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
  2. Coordinate required final finish with Architect before application.

### 3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:
  1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
  2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
  3. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. 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.
- C. Equipment Bases and Foundations:
  1. Coordinate sizes and locations of concrete bases with actual equipment provided.
  2. Construct concrete bases 4 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported

equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.

3. Minimum Compressive Strength: As indicated herein.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.
  - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - b. Cast anchor-bolt insert into bases.
  - c. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Reinforce interior stairs that use concrete fill for the landings and/or treads with either microsynthetic monofilament fibers (at a minimum dosage rate of 1.0 lbs/cy) or 4x4-W1.4xW1.4 welded wire fabric.
3. Screed, tamp, and trowel finish concrete surfaces.

### 3.10 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h, calculated in accordance with ACI 305.1, before and during finishing operations.

B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. If forms remain during curing period, moist cure after loosening forms.
3. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
  - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
  - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
  - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
  - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
  - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.



- 1) Recoat areas subject to heavy rainfall within three hours after initial application.
- 2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:
  - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
    - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
      - a) Lap edges and ends of absorptive cover not less than 12-inches.
      - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
    - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
      - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
      - b) Cure for not less than seven days.
    - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
      - a) Water.
      - b) Continuous water-fog spray.
  - b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
    - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
      - a) Lap edges and ends of absorptive cover not less than 12 inches.
      - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
    - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

- a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
  - b) Cure for not less than seven days.
- 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
- a) Water.
  - b) Continuous water-fog spray.
- c. Floors to Receive Polished Finish: Contractor has option of the following:
- 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
    - a) Lap edges and ends of absorptive cover not less than 12 inches.
    - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
  - 2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
    - a) Water.
    - b) Continuous water-fog spray.
- d. Floors to Receive Curing Compound:
- 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
  - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
  - 3) Maintain continuity of coating, and repair damage during curing period.
  - 4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.
- e. Floors to Receive Curing and Sealing Compound:
- 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
  - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
  - 3) Repeat process 24 hours later and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.11 TOLERANCES

- A. Conform to ACI 117.

3.12 APPLICATION OF LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.
  - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  - 2. Do not apply to concrete that is less than seven days' old.
  - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
  - 4. Rinse with water; remove excess material until surface is dry.
  - 5. Apply a second coat in a similar manner if surface is rough or porous.

3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.
  - 1. Defer joint filling until concrete has aged at least one month.
  - 2. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.
- D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete:
  - 1. Repair and patch defective areas when approved by Architect.
  - 2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. 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.

- a. Limit cut depth to 3/4 inch.
  - b. Make edges of cuts perpendicular to concrete surface.
  - c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
  - d. Fill and compact with patching mortar before bonding agent has dried.
  - e. 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 matches surrounding color.
    - a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
    - b. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.
  - a. Correct low and high areas.
  - b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
2. Repair finished surfaces containing surface defects, including 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.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.
  - a. Finish repaired areas to blend into adjacent concrete.
5. Correct other low areas scheduled to remain exposed with repair topping.
  - a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
  - b. Prepare, mix, and apply repair topping and primer in accordance with 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.
  - a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
  - b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.

- c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
  - d. Place, compact, and finish to blend with adjacent finished concrete.
  - e. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.
- a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
  - b. Dampen cleaned concrete surfaces and apply bonding agent.
  - c. Place patching mortar before bonding agent has dried.
  - d. Compact patching mortar and finish to match adjacent concrete.
  - e. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.15 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
  2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
  3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
    - a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
      - 1) Project name.
      - 2) Name of testing agency.
      - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
      - 4) Name of concrete manufacturer.
      - 5) Date and time of inspection, sampling, and field testing.
      - 6) Date and time of concrete placement.
      - 7) Location in Work of concrete represented by samples.
      - 8) Date and time sample was obtained.
      - 9) Truck and batch ticket numbers.
      - 10) Design compressive strength at 28 days.
      - 11) Concrete mixture designation, proportions, and materials.
      - 12) Field test results.

- 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
  - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- B. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- C. Inspections:
1. Headed bolts and studs.
  2. Verification of use of required design mixture.
  3. Concrete placement, including conveying and depositing.
  4. Curing procedures and maintenance of curing temperature.
  5. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:
1. Testing Frequency: Obtain one composite sample 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 provides 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 C143/C143M:
    - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
    - b. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; ASTM C173/C173M volumetric method, for structural lightweight concrete.
    - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C1064/C1064M:
    - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
  5. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.
    - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

6. Compression Test Specimens: ASTM C31/C31M:
    - a. Cast and laboratory cure two sets of four 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
  7. Compressive-Strength Tests: ASTM C39/C39M.
    - a. Test one set of two laboratory-cured specimens at seven days and three sets of two specimens at 28 days.
    - b. 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.
  8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
  9. 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 if specified compressive strength is 5,000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5,000 psi.
  10. 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.
  11. 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 Engineer of Record.
    - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Engineer of Record.
      - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301, section 1.6.6.3.
  12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 24 hours of completion of floor finishing and promptly report test results to Architect.

### 3.16 PROTECTION

- A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.
  2. Diaper hydraulic equipment used over concrete surfaces.

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3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000



**SECTION 03 45 00  
PRECAST ARCHITECTURAL CONCRETE****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Architectural precast concrete components indicated on plans.
- B. Architectural precast concrete accessories.
- C. Supports, anchors, and attachments.
- D. Grouting under panels.

**1.02 REFERENCE STANDARDS**

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).
- B. ACI SPEC-301 - Specifications for Concrete Construction; 2020.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
- E. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2019.
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.
- G. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2022.
- H. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
- I. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete; 2010a (Reapproved 2016).
- J. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete; 2017a.
- K. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- L. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products; 2013.
- M. PCI MNL-120 - PCI Design Handbook; 2017, with Errata (2021).
- N. PCI MNL-122 - Architectural Precast Concrete: Fully Revised Manual Including New Sections, Extensive Updates, and Detailed Specifications to Meet Today's Construction Needs.; 2007.
- O. PCI MNL-123 - Connections Manual: Design and Typical Details of Connections for Precast and Prestressed Concrete; 1988.
- P. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction; 2000.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.
- C. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, connection details, support items, dimensions, openings, and relationship to adjacent materials.

- D. Samples: Submit two verification, 12 by 12 inch (300 by 300 mm) in size, illustrating surface finish, color and texture.

### 1.05 QUALITY ASSURANCE

- A. Design Engineer Qualifications: Design precast concrete units under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in the State in which the Project is located.
- B. Fabricator Qualifications:
  - 1. Firm having at least 2 years of documented experience in production of precast concrete of the type required.

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handling: Lift and support precast units only from support points.
- B. Protect units to prevent staining, chipping, or spalling of concrete.

## PART 2 PRODUCTS

### 2.01 PRECAST UNITS, GENERAL

- A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI CODE-318.
  - 1. Concrete Face Mix: Minimum 5000 psi (34 MPa), 28 day strength, air entrained to 5 to 7 percent; comply with ACI SPEC-301.
  - 2. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.
  - 3. Calculate structural properties of units in accordance with ACI CODE-318.
  - 4. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
  - 5. Provide connections that accommodate building movement and thermal movement and adjust to misalignment of structure without unit distortion or damage.
- B. Finish Type A: Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.
  - 1. Limestone simulated appearance.
  - 2. Finish all exposed surfaces to match face surface finish.
  - 3. Finish unexposed surfaces to as-cast finish.

### 2.02 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) (280 MPa).
  - 1. Deformed billet-steel bars.
  - 2. Galvanized in accordance with ASTM A767/A767M, Class I.
- B. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.
  - 1. Form: Flat Sheets.

### 2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
- B. Fine and Coarse Structural Aggregates: ASTM C33/C33M.
- C. Lightweight Structural Aggregate: ASTM C330/C330M.
- D. Surface Finish Aggregate: Complying with sample in office of Architect.
- E. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
  - 1. Concentration: Base dosage rates on weight of Portland cement, fly ash, silica fume, and other cementitious materials but not aggregate or sand.
  - 2. Color(s): As selected by Architect from manufacturer's full range.
- F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

- G. Air Entrainment Admixture: ASTM C260/C260M.
- H. Grout:
  - 1. Non-shrink, non-metallic, minimum 10,000 psi (70 MPa), 28 day strength.

#### **2.04 SUPPORT DEVICES**

- A. Connecting and Support Devices; Anchors and Inserts: ASTM A666 Type 304 stainless steel.
  - 1. Clean surfaces of rust, scale, grease, and foreign matter.

#### **2.05 FABRICATION**

- A. Fabricate in compliance with PCI MNL-117 and PCI MNL-135.
- B. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.

#### **2.06 FABRICATION TOLERANCES**

- A. Comply with PCI MNL-117 and PCI MNL-135.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

#### **3.02 PREPARATION**

- A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

#### **3.03 ERECTION**

- A. Erect units without damage to shape or finish. Replace or repair damaged panels.
- B. Erect units level and plumb within allowable tolerances.
- C. Align and maintain uniform horizontal and vertical joints as erection progresses.
- D. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect.
- E. Fasten units in place with mechanical connections.
- F. Provide non-combustible shields during welding operations.

#### **3.04 TOLERANCES**

- A. Erect members level and plumb within allowable tolerances. Comply with PCI MNL-135.

**END OF SECTION**

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**SECTION 03 49 00  
GLASS-FIBER REINFORCED CONCRETE****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Architectural precast glass-fiber-reinforced concrete columns.
- B. Supports, anchors, and attachments.

**1.02 REFERENCE STANDARDS**

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- C. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2023.
- D. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- E. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).
- H. PCI MNL-128 - Recommended Practice for Glass Fiber Reinforced Concrete Panels; 2001.

**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. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.
- C. Shop Drawings: Indicate locations, layout, fabrication details, reinforcement, connection details, dimensions, and relationship to adjacent materials. Provide erection drawings.
- D. Samples: Submit two samples 6 inch (150 mm) by 6 inch (150 mm) in size illustrating surface color, finish and texture.
- E. Manufacturer's Installation Instructions: Indicate surface cleaning instructions.

**1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in performing the work of this section with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of documented experience.

**1.06 PROJECT CONDITIONS**

- A. Coordinate the Work with installation of backup supporting structure, application of joint sealers.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Handle units to position, consistent with their shape and design. Lift and support only from support points.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Glass-Fiber-Reinforced Concrete:
  - 1. Advanced Architectural Stone: [www.advancedarchitecturalstone.com/#sle](http://www.advancedarchitecturalstone.com/#sle).
  - 2. Premier Stoneworks, LLC: [www.premier-stoneworks.com/#sle](http://www.premier-stoneworks.com/#sle).
  - 3. Stromberg Architectural Products, Inc: [www.strombergarchitectural.com/#sle](http://www.strombergarchitectural.com/#sle).
  - 4. Melton Classic, Inc.: [www.meltonclassics.com](http://www.meltonclassics.com).

- a. FiberCrete GFRC Column Basis of Design or approved substitution.
5. Fibblast: [www.fibblast.com](http://www.fibblast.com).
6. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.02 GLASS-FIBER-REINFORCED CONCRETE UNITS

- A. Glass-Fiber-Reinforced Concrete Units: Factory-fabricated, using rigid molds, constructed to maintain unit panel uniform in shape, size and finish.
  1. Design and fabricate to comply with applicable codes.
  2. Design to withstand dead loads, positive and negative wind loads, and erection forces.
  3. Control deflection of units to maintain fit with adjacent construction and openings within their tolerances.
  4. Design connections to accommodate building movement without damage to components, wrinkling of joint connections, breakage of seals, or moisture penetration.
  5. Allow for adjustment of connections to accommodate misalignment of structure without permanent distortion.
  6. Concrete Mix: Of strength to accommodate panel configuration, panel size and weight, and manufacturing criteria, air entrained.
  7. Surface Burning Characteristics: Flame spread index of 5 or less; smoke developed index of 20 or less; when tested in accordance with ASTM E84.
  8. Welding: Comply with AWS D1.1/D1.1M.
  9. Appearance: Ensure exposed-to-view finish surfaces of units are uniform in color and appearance.
  10. Finish of Exposed-to-View Precast Unit Surfaces: Match adjacent cast-in-place concrete finish.

## 2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M Portland Type I - Normal; white color.
- B. Concrete Aggregates: ASTM C33/C33M.
- C. Reinforcement: Alkali resistant chopped glass fiber rovings specifically formulated for use in concrete, with lengths varying from 1-1/2 to 2 inches (38 to 51 mm).
- D. Color Additives: Pure, concentrated mineral pigments specifically intended for mixing into concrete and complying with ASTM C979/C979M.
  1. Color(s): As selected by Architect from manufacturer's full range.

## 2.04 SUPPORT DEVICES

- A. Connecting and Support Devices: ASTM A36/A36M steel; hot-dip galvanized in accordance with ASTM A153/A153M.

## 2.05 FABRICATION

- A. Spray-up concrete mix in multiple passes; maintain consistent quality during manufacture.
- B. Place metal framing members in position in mold.
- C. Embed anchors, inserts, plates, angles, and other cast-in items as indicated on shop drawings.
- D. Fabricate connecting devices, items fit to framing members, fasteners and accessories necessary for proper installation.
- E. Locate hoisting devices to permit device removal after erection.
- F. Cure units to minimize appearance blemishes such as non-uniformity, staining or surface cracking.
- G. Identify each unit with corresponding code on erection drawings, in location not visible in finish work.
- H. Exposed Non-Galvanized Steel Components: Clean surfaces of rust, scale, grease, and foreign matter; prime paint in one coat, except surfaces in direct contact with concrete or requiring field welding.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Coordinate installation with structural supports, backup, and opening framing, if any.

- B. Install units without damage to shape or finish. Replace or repair damaged panels.
- C. Install units level and plumb within allowable tolerances.
- D. Align and maintain uniform horizontal and vertical joints as erection progresses.
- E. Site cutting of panels not permitted.
- F. Fasten units in place with mechanical connections.

**3.02 TOLERANCES**

- A. Maximum Variation from Plane of Location: 1/4 inch in 10 feet and 3/8 inch in 100 feet (6 mm in 3 m and 9 mm in 30 m), non-cumulative.
- B. Maximum Offset from True Alignment Between Two Connecting Units: 1/4 inch (6 mm).
- C. Variation From Dimensions Indicated on Shop Drawings: Plus or minus 1/8 inch (3 mm).
- D. Maximum Misalignment of Anchors, Inserts, Openings: 1/8 inch (3 mm).

**3.03 CLEANING**

- A. Clean units according to manufacturer's written instructions.
  - 1. Remove dirt, stains, and residue.
  - 2. Protect adjacent materials during cleaning.

**3.04 PROTECTION**

- A. Protect installed units from damage.

**END OF SECTION**

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**SECTION 04 05 11  
MASONRY MORTARING AND GROUTING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Mortar for masonry.
- B. Grout for masonry.

**1.02 REFERENCE STANDARDS**

- A. ASTM C5 - Standard Specification for Quicklime for Structural Purposes; 2018.
- B. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.
- C. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2023.
- D. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- E. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- F. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
- G. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.
- H. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
- I. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.
- J. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- K. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry; 2020.
- L. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2019a.
- M. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

**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. Also include required environmental conditions and admixture limitations.
- C. Samples: Submit two samples of mortar, illustrating mortar color and color range.
- D. Reports: Submit reports on mortar indicating compliance of mortar to property requirements of ASTM C270 and test and evaluation reports per ASTM C780.
- E. Reports: Submit reports on grout indicating compliance 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 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. At Contractor's option, mortar and grout may be field-mixed from packaged dry materials, made from factory premixed dry materials with addition of water only, or ready-mixed.
- B. Mortar Color:
  - 1. Masonry: Natural gray unless otherwise indicated.
  - 2. Masonry Full-Depth Stone Veneer: Color as selected by Architect from manufacturer's full range.
- 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, Load-bearing Masonry: Type N.
  - 5. Exterior, Non-loadbearing Masonry: Type N.
  - 6. Interior, Load-bearing Masonry: Type N.
  - 7. Interior, Non-loadbearing Masonry: Type O.
- D. Grout Mix Designs:
  - 1. Bond Beams and Lintels: 3,000 psi (21 MPa) strength at 28 days; 8-10 inches (200-250 mm) slump; provide premixed type in accordance with ASTM C 94/C 94M.
    - a. Fine grout for spaces with smallest horizontal dimension of 2 inches (50 mm) or less.
    - b. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches (50 mm).

**2.02 MATERIALS**

- A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
  - 1. Color: Standard gray.
- B. 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 Architect's color sample.
- D. Hydrated Lime: ASTM C207, Type S.
- E. Quicklime: ASTM C5, non-hydraulic type.
- F. Mortar Aggregate: ASTM C144.
- G. Grout Aggregate: ASTM C404.
- H. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
  - 1. Color(s): As selected by Architect from manufacturer's full range.
- I. 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. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio; mix in accordance with manufacturer's instructions, uniform in coloration.
- D. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- E. Do not use anti-freeze compounds to lower the freezing point of mortar.
- F. 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 GROUTING**

- A. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of Contract Documents.
- B. Low-Lift Grouting:
  - 1. Limit height of pours to 12 inches (300 mm).
  - 2. Limit height of masonry to 16 inches (400 mm) above each pour.
  - 3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
  - 4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.
- C. High-Lift Grouting:
  - 1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
  - 2. Place grout for spanning elements in single, continuous pour.

#### **3.04 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.
- C. Test and evaluate grout in accordance with ASTM C1019 procedures.

**END OF SECTION**

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**SECTION 04 20 00  
UNIT MASONRY****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Concrete block.
- B. Reinforcement and anchorage.
- C. Accessories.

**1.02 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.
- C. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire; 2019.
- D. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2023.
- E. ASTM C91/C91M - Standard Specification for Masonry Cement; 2023.
- F. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2023.
- G. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units; 2023a.
- H. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- I. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.
- J. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.
- K. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.
- L. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.
- M. ASTM C476 - Standard Specification for Grout for Masonry; 2023.
- N. ASTM C780 - Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2023.
- O. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.
- P. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017 (Reapproved 2023).
- Q. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2015, with Editorial Revision (2022).
- R. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.
- S. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.
- T. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.
- U. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.
- V. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

**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. 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.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of 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 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 CONCRETE MASONRY UNITS**

- A. Concrete Block: Comply with referenced standards and as follows:
  - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches (400 by 200 mm) and nominal depths as indicated on drawings for specific locations.
  - 2. Load-Bearing Units: ASTM C90, lightweight.
    - a. Hollow block, as indicated.
    - b. Exposed Faces: Manufacturer's standard color and texture.
  - 3. Nonloadbearing Units: ASTM C129.
    - a. Hollow block, as indicated.
    - b. Lightweight.

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

- A. Mortar and Grout: As specified in Section 04 05 11.

### **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.

### **2.04 FLASHINGS**

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

### **2.05 ACCESSORIES**

- A. Backer Rod: Closed cell polyethylene; oversized 50 percent to joint width; self expanding; maximum lengths available.
- B. 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.
- C. 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.

D. Weeps:

1. Type: Molded PVC grilles, insect resistant and polyethylene tubing.
2. Color(s): As selected by Architect from manufacturer's full range.
3. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

### **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. Concrete Masonry Units:
  1. Bond: Running.
  2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
  3. Mortar Joints: Concave.

#### **3.05 PLACING AND BONDING**

- A. Lay hollow masonry units with face shell bedding on head and bed joints.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar and mortar smears as work progresses.
- D. Interlock intersections and external corners.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- G. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.
- H. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

#### **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.
- B. Install cavity vents in veneer and cavity walls at 32 inches (800 mm) on center horizontally below shelf angles and lintels and near top 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. 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. Masonry Back-Up: Embed anchors in masonry back-up to bond veneer at maximum 2-2/3 sq ft (0.25 sq m) of wall surface per anchor. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches (200 mm) on center.
- B. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 2-2/3 sq ft (0.25 sq m) of wall surface per anchor. 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. Terminate flashing up 8 inches (203 mm) minimum on vertical surface of backing:
  - 1. Install vertical leg of flashing behind water-resistive barrier sheet over backing.
- C. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.
- 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 (101 mm) bearing on each side of opening.

### 3.11 GROUTED COMPONENTS

- A. Lap splices minimum 48 bar diameters.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.
- D. At bearing locations, fill masonry cores with grout for a minimum 12 inches (300 mm) either side of opening.

### 3.12 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
  - 1. Fill adjacent masonry cores with grout minimum 12 inches (300 mm) from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

### 3.13 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).

**3.14 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.

**3.15 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00 - Quality Requirements.
- B. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.
- C. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

**3.16 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.

**3.17 PROTECTION**

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

**END OF SECTION**

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**SECTION 04 22 00.13  
CONCRETE UNIT VENEER MASONRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete Veneer Masonry.

**[SPECIFIER NOTES] – RETAIN ONLY THOSE REFERENCES CONTAINED WITHIN THE EDITED SCOPE OF WORK IN THIS SECTION AND DELETE ALL OTHERS.**

**2.01 DEFINITIONS**

- A. CMU: Concrete Masonry Unit.
- B. WRB: Water Resistive Barrier.

**2.02 ADMINISTRATIVE REQUIREMENTS**

- A. Scheduling: Provide to Owner or Owner's representative a schedule and list of participants required to attend coordination and progress update meetings.

**SUBSTRATE PREPARATION INSTRUCTIONS AND RECOMMENDATIONS.**

**INSTALLATION MEANS AND METHODS.**

**RECOMMENDATIONS AND REQUIREMENTS FOR PROPER STORAGE AND HANDLING.**

**SUBMIT MANUFACTURER'S APPROVED SHOP DRAWINGS DETAILING THE SECTION AND ELEVATION VIEWS OF EACH PRODUCT TO BE INSTALLED.**

**SUBMIT CONFIRMATION AND DETAILS OF MANUFACTURER'S WARRANTY, EXTENDED WARRANTY, AND REPLACEMENT POLICIES.**

**STANDARD SAMPLE DISPLAY CONSISTING OF A SMALL REPRESENTATION OF VENEER UNITS SHOWING THE FULL RANGE OF COLORS AND TEXTURES.**

**THE MOCK-UP SHOULD BE A NOMINAL 36 INCHES X 36 INCHES (1M X 1M).**

**CONSTRUCT THE MOCK-UP USING THE VENEER SIZE, COLOR BLEND, TEXTURE, JOINT SIZE, AND INSTALLATION METHODS SPECIFIED.**

**ARCHITECT AND OWNER'S REPRESENTATIVE MUST APPROVE THE MOCKUP PRIOR TO COMMENCEMENT OF WORK.**

**11.01 CLOSEOUT SUBMITTALS**

- A. Spare Materials: Provide spare veneer units of each color and finish combination used on the project.

**SUBMIT SUBSTITUTION REQUESTS IN ACCORDANCE WITH PROVISIONS OF SECTION 01 60 00.**

**12.01 PERFORMANCE REQUIREMENTS**

- A. Adhered veneer units must not exceed 2 5/8 inches in thickness, 36 inches in any face dimension, and no greater than 5 sq. ft. in total area.
- B. Individual veneer units not to exceed 15 lbs./sq. ft. (saturated weight).
- C. Shear Strength: Adhesion developed between adhered thin veneer units and backing must attain a shear strength of at least 50 psi based on gross unit surface area when tested in accordance with ASTM C482, or shall be adhered in compliance with Article 3.3 C of TMS 602/ACI 530.1/ASCE 6.
- D. Compressive Strength: Minimum 3500 psi with no individual specimen having a measured compressive strength less than 3000 psi.
- E. Freeze-thaw durability: Meets or exceeds the requirements of ASTM C1262/C1262M -98 and exhibit a mass loss no greater than 1.5%. Test specimens must not show any fracture completely through the cross section when subjected to 50 consecutive freeze/thaw cycles.
  - 1. Freeze-Thaw Resistance: Meet or exceed the requirements of ASTM C1262.
  - 2. Abrasion Resistance: Meet or exceed the requirements of ASTM C744.
  - 3. Adhesion: Meet or exceed the requirements of ASTM C744.

4. Color Change: Meet or exceed the requirements of ASTM C744.
5. Resistance to Crazeing: Meet or exceed the requirements of ASTM C744.
6. Integral Water Repellant: Concrete Masonry Units must include an integral water repellant (IWR) admixture at the time of production.

**BASIS OF DESIGN PRODUCT: LAMINA® STONE, FROM ECHELON OR APPROVED EQUAL**

**FINISH: AS SELECTED FROM THE MANUFACTURER'S STANDARD COLOR PALETTE.**

**FACE APPEARANCE: FALSE JOINT UNITS**

**COMPRESSIVE STRENGTH: MINIMUM 3500 PSI WHEN TESTED IN ACCORDANCE WITH ASTM C1634.**

**MINIMUM ABSORPTION BY WEIGHT: 10 LBS./CU. FT. (BASED ON NORMAL WEIGHT.)**

**MINIMUM WEIGHT: 125 LBS./CU. FT.**

### **PART 3 EXECUTION**

#### **19.01 EXAMINATION**

- A. Verify that site conditions are properly prepared to receive concrete masonry units.
- B. Verify that bearing elements are within tolerances conforming to the requirements of ACI 117.
- C. Verify that locations of penetrations, projections and built-in items are correct and properly prepared for work specified in this section.
- D. Provide adequate lighting for masonry work by placing all lighting at a reasonable distance from the wall for even illumination.

#### **19.02 PREPARATION**

- A. Proceed with installation only after substrate(s) are been properly prepared and within tolerances recommended by the manufacturer.
- B. Install through-wall flashing over exterior windows, relieving angles, doors, tops of walls, at the inside base of cavity walls, and under sills.
- C. Commencement of installation constitutes acceptance of site conditions.
- D. Draw veneer from more than one pallet at a time during installation.

**ALL FLASHING AND ACCESSORY DETAILING COMPONENTS MUST BE CORROSION RESISTANT. VERIFY THAT ALL FLASHING, INCLUDING ADJACENT ROOF FLASHING, HAS BEEN PROPERLY INSTALLED. EXTEND FLASHING MATERIAL ABOVE HORIZONTAL TERMINATIONS, ROOFING MATERIAL, DRAINAGE PLANES OR DRAINAGE PRODUCTS.**

**INTEGRATE ALL FLASHING MATERIALS WITH MOISTURE RESISTIVE BARRIERS TO PREVENT WATER PENETRATION INTO STRUCTURE. LAP WATER RESISTIVE BARRIERS OVER WEEP SCREED FLANGES IN A WATER SHEDDING FASHION.**

**APPLY VENEER WITH A FULL MORTAR BED AND FULL HEAD JOINTS, PROPERLY JOINTED WITH OTHER WORK. BUTTERING CORNERS OF JOINTS, AND DEEP OR EXCESSIVE FURROWING OF MORTAR JOINTS IS NOT PERMITTED.**

**INSTALL CONCRETE VENEER IN ACCORDANCE WITH INDUSTRY ACCEPTED MASONRY PRACTICES AND MANUFACTURER'S INSTRUCTIONS.**

**DO NOT USE VENEER UNITS WITH BROKEN CORNERS AND EDGES.**

**PROVIDE A NOMINAL 1 TO 1 ½ INCH AIRSPACE BETWEEN THE VENEER AND THE OUTERMOST LAYER OF THE WALL RECEIVING THE WORK.**

**PROVIDE WIRE ANCHORS OR ADJUSTABLE ANCHORS SPACED NO GREATER THAN 16 INCHES ON CENTER VERTICALLY AND HORIZONTALLY.**

**WITHIN 8 INCHES OF TRANSITIONS, TERMINATIONS AND OPENINGS IN THE WALL, DECREASE ANCHOR SPACING TO NO GREATER THAN 12 INCHES ON CENTER VERTICALLY AND HORIZONTALLY.**

**TOOL ALL JOINTS INTO THE SPECIFIED TEXTURE WHEN MORTAR IS THUMBPRINT HARD.**

**REMOVE MORTAR FROM THE FACE OF MASONRY UNITS BEFORE IT SETS.**

**TUCKPOINT JOINTS OF SCORED UNITS FOR PROPER APPEARANCE AND TO PREVENT WATER PENETRATION. RAKED JOINTS ARE NOT PERMITTED AND WILL BE CONSIDERED DEFECTIVE WORK.**

**END OF SECTION**

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## SECTION 051200 - STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

1. Structural steel.
2. Shear stud connectors.
3. Shrinkage-resistant grout.

- B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
2. Section 053100 "Steel Decking" for field installation of shear stud connectors through deck.
3. Section 055000 "Metal Fabrications" for miscellaneous steel fabrications and other steel items not defined as structural steel.
4. Section 099600 "High-Performance Coatings" for painting requirements.

#### 1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303 "Code of Standard Practice for Steel Buildings and Bridges".

#### 1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

#### 1.5 PREINSTALLATION MEETINGS

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

1.6 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Shear stud connectors.
4. Anchor rods.
5. Threaded rods.
6. Shop primer.
7. Shrinkage-resistant grout.

B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

C. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.

D. Delegated-Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. For Fabricator, see either 1.8.A.1 or 1.8.A.2 for informational submittals needed to satisfy qualification requirements.
2. For Erector, see either 1.8.B.1 or 1.8.B.2 for informational submittals needed to satisfy qualification requirements.

B. Welding certificates, as used by either the Fabricator or the Erector.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural-steel materials, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.



2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shear stud connectors.

## 1.8 QUALITY CONTROL

- A. Fabricator Qualifications: The Fabricator must meet at least one of the two following requirements.
1. A Fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Accreditation Criteria 172). The Fabricator shall also have a minimum of 5 years of experience in fabricating structural steel like that indicated for this project (with a record of successful service performance) and sufficient capacity to fabricate the structural steel without delaying the work. Qualification requirements shall be satisfied by submittal of the following:
    - a. Completed project history for Fabricator, specifically focused on projects whose structural steel is like that for this project. Project history shall include Owner and Structural Engineer (as well as primary contacts) for each project listed. This qualification requirement shall be submitted as part of the bidding process.
    - b. Current AISC or IAS certification documents.
  2. A Fabricator that has an established and maintained quality control program to ensure that the work is performed in accordance with the requirements in ANSI/AISC 303 “Code of Standard Practice for Steel Buildings and Bridges”, ANSI/AISC 360 “Specification for Structural Steel Buildings”, and the Contract Documents. Program shall at a minimum address inspection of the items noted in ANSI/AISC 360 N2. The Fabricator shall also have a minimum of 5 years of experience in fabricating structural steel like that indicated for this project (with a record of successful service performance) and sufficient capacity to fabricate the structural steel without delaying the work. Qualification requirements shall be satisfied by submittal of the following:
    - a. Completed project history for Fabricator, specifically focused on projects whose structural steel is like that for this project. Project history shall include Owner and Structural Engineer (as well as primary contacts) for each project listed. This qualification requirement shall be submitted as part of the bidding process.
    - b. A written quality control manual that shall include (at a minimum) procedures for material control, inspection, and non-conformances.
    - c. Quality Control Inspector (QCI) qualifications.
- B. Erector Qualifications: The Erector must meet at least one of the two following requirements.
1. An Erector who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE. The Erector shall also have a minimum of 5 years of experience in erecting structural steel like that indicated for this project (with a record of successful service performance) and sufficient capacity to erect the structural steel without delaying the work. Qualification requirements shall be satisfied by submittal of the following:

- a. Completed project history for Erector, specifically focused on projects whose structural steel is like that for this project. Project history shall include Owner and Structural Engineer (as well as primary contacts) for each project listed. This qualification requirement shall be submitted as part of the bidding process.
  - b. Current AISC certification documents.
2. An Erector that has an established and maintained quality control program to ensure that the work is performed in accordance with the requirements in ANSI/AISC 303 “Code of Standard Practice for Steel Buildings and Bridges”, ANSI/AISC 360 “Specification for Structural Steel Buildings”, and the Contract Documents. Program shall at a minimum address inspection of the items noted in ANSI/AISC 360 N2. The Erector shall also have a minimum of 5 years of experience in erecting structural steel like that indicated for this project (with a record of successful service performance) and sufficient capacity to erect the structural steel without delaying the work. Qualification requirements shall be satisfied by submittal of the following:
- a. Completed project history for Erector, specifically focused on projects whose structural steel is like that for this project. Project history shall include Owner and Structural Engineer (as well as primary contacts) for each project listed. This qualification requirement shall be submitted as part of the bidding process.
  - b. A written quality control manual that shall include (at a minimum) procedures for material control, inspection, and non-conformances.
  - c. Quality Control Inspector (QCI) qualifications.
- C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
  2. Clean and re-lubricate bolts and nuts that become dry or rusty before use.
  3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Comply with applicable provisions of the following specifications and documents:
  - 1. ANSI/AISC 303 “Code of Standard Practice for Steel Buildings and Bridges”.
  - 2. ANSI/AISC 360 “Specification for Structural Steel Buildings”.
  - 3. RCSC's "Specification for Structural Joints Using High-Strength Bolts".
- B. Connection Design Information:
  - 1. Design connections and final configuration of member reinforcement at connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.
    - a. Use Load and Resistance Factor Design; data are given at factored-load level.
- C. Moment Connections: Type PR, partially restrained.
- D. Construction: As indicated.

### 2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A992/A992M.
- B. Channels, Angles: ASTM A36/A36M.
- C. Plate and Bar: ASTM A36/A36M, and ASTM A572/A572M, Grade 50 as indicated.
- D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade B structural tubing.
- E. Steel Pipe: ASTM A500/A500M, Grade B.
  - 1. Weight Class: Standard, or as indicated.
  - 2. Finish: Black except where indicated to be galvanized.
- F. Welding Electrodes: Comply with AWS requirements.

### 2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
- B. High-Strength A490 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A490, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.

- C. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

## 2.4 RODS

- A. Unheaded Anchor Rods: ASTM F1554, Grade 36, or Grades 55 and 105 as indicated on the Drawings.

1. Configuration: Straight.
2. Nuts: ASTM A563 heavy-hex carbon steel.
3. Plate Washers: ASTM A36/A36M carbon steel.
4. Washers: ASTM F436, Type 1, hardened carbon steel.
5. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.

- B. Headed Anchor Rods: ASTM F1554, Grade 36, or Grades 55 and 105 as indicated on the Drawings.

1. Configuration: Straight.
2. Nuts: ASTM A563 heavy-hex carbon steel.
3. Plate Washers: ASTM A36/A36M carbon steel.
4. Washers: ASTM F436, Type 1, hardened carbon steel.
5. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.

- C. Threaded Rods: ASTM A36/A36M.

1. Nuts: ASTM A 63 heavy-hex carbon steel.
2. Washers: ASTM F436, Type 1, hardened carbon steel.
3. Finish: Hot-dip zinc coating, ASTM A153/A153M, Class C.

## 2.5 PRIMER

- A. Steel Primer:

1. Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

- B. Galvanized-Steel Primer: MPI#134.

1. Etching Cleaner: MPI#25, for galvanized steel.
2. Galvanizing Repair Paint: ASTM A780/A780M.

## 2.6 SHRINKAGE-RESISTANT GROUT

- A. Non-metallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, non-metallic aggregate grout, non-corrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

## 2.7 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
1. Camber structural-steel members where indicated.
  2. Fabricate beams with rolling camber up.
  3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
  4. Mark and match-mark materials for field assembly.
  5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 1.
- F. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.
- G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.
- H. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- I. Inspection Requirements: Quality control inspection tasks shall be performed by the Fabricator's QCI in accordance with ANSI/AISC 360 N5.4 (Inspection of Welding), N5.6 (Inspection of High-Strength Bolting), and N5.7 (Inspection of Galvanized Structural Steel Main Members). Tasks in Tables N5.4-1 through N5.4-3 and Tables N5.6-1 through N5.6-3 listed for quality control (QC) are those inspections performed by the QCI(s) to ensure that the work is performed in accordance with the Contract Documents.

1. Non-destructive testing (NDT) of welded joints provided during fabrication shall be performed by either an independent and qualified testing agency or the qualified QCI(s). All testing reports shall be submitted to the Owner for review.
  - a. Conduct NDT of all welded joints primarily supporting gravity loads (i.e. cantilevers). Reduction in the rate of NDT per N5.5e is prohibited.
  - b. For Risk Category II structures, conduct NDT of 10% of remaining CJP groove welds for materials 5/16" thick and greater per ANSI/AISC 360 N5.5b.
  - c. For Risk Category III and IV structures, conduct NDT of all remaining CJP groove welds for materials 5/16" thick and greater per ANSI/AISC 360 N5.5b.
  - d. Conduct NDT of all welded joints subject to fatigue, where required by ANSI/AISC 360 Appendix 3, Table A-3.1. Reduction in the rate of NDT per N5.5e is prohibited.
- J. Special Inspections: Where special inspections are required by the Contract Documents, the Owner will engage the Special Inspector to perform an audit of the fabrication and quality control practices employed by the Fabricator. Where the Fabricator is qualified through the option noted in 1.8.A.1, the requirement for this audit during fabrication shall be waived.
  1. The Fabricator shall meet all requirements of ANSI/AISC 303 8.5 to accommodate an audit of the fabrication shop.
  2. Prior to the commencement of fabrication, the Special Inspector shall submit to the Owner for review a written plan identifying the frequency and extent of visits to the fabrication shop.
  3. At a minimum, the audit by the Special Inspector shall include review of the following:
    - a. The Fabricator's quality control manual and procedures for material control, inspection, and non-conformances.
    - b. Material test reports for all members, fasteners, and consumables.
    - c. The steel fabrication process including member fit-up, material selection, welding procedures and personnel, etc. Records need to be maintained for all material sources, members using the noted materials, consumables used, welder(s) employed, dates of completion, and when the QCI completed the inspection.
    - d. Inspections representing a sampling of the before, during, and after QA tasks noted in ANSI/AISC 360 N5.5, N5.6, and N5.8.
- K. At the completion of fabrication, the Fabricator shall submit a certificate of compliance to the Owner stating that the materials supplied and work performed by the Fabricator are in accordance with the Contract Documents. All testing/inspection reports generated as part of 2.7.I or 2.7.J shall also be submitted for review at the completion of fabrication.

## 2.8 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
  1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

## 2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize items as indicated on the Drawings.

## 2.10 SHOP PRIMING

- A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:

1. SSPC-SP 2.
2. SSPC-SP 3.

- C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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## 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.
  - 1. Do not remove temporary shoring supporting composite deck construction and structural-steel framing until cast-in-place concrete has attained its design compressive strength.

## 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Base Plates, Bearing Plates, and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Weld plate washers to top of baseplate.
  - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. Inspection Requirements: Quality control inspection tasks shall be performed by the Erector's QCI in accordance with ANSI/AISC 360 N5.4 (Inspection of Welding), N5.6 (Inspection of High-Strength Bolting), and N5.7 (Inspection of Galvanized Structural Steel Main Members). Tasks in



Tables N5.4-1 through N5.4-3 and Tables N5.6-1 through N5.6-3 listed for quality control (QC) are those inspections performed by the QCI(s) to ensure that the work is performed in accordance with the Contract Documents.

1. Non-destructive testing (NDT) of welded joints provided during erection shall be performed by an independent and qualified testing agency (see 3.3.J). All testing reports shall be submitted to the Owner for review.
    - a. Conduct NDT of all welded joints primarily supporting gravity loads (i.e. cantilevers). Reduction in the rate of NDT per N5.5e is prohibited.
    - b. For Risk Category II structures, conduct NDT of 10% of remaining CJP groove welds for materials 5/16" thick and greater per ANSI/AISC 360 N5.5b.
    - c. For Risk Category III and IV structures, conduct NDT of all remaining CJP groove welds for materials 5/16" thick and greater per ANSI/AISC 360 N5.5b.
    - d. Conduct NDT of all welded joints subject to fatigue, where required by ANSI/AISC 360 Appendix 3, Table A-3.1. Reduction in the rate of NDT per N5.5e is prohibited.
  - I. Testing Agency: The Owner will engage an independent and qualified testing agency to perform tests and inspections.
    1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts".
    2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M. Non-destructive testing (NDT) methods (as required) are as follows:
      - a. Liquid Penetrant Inspection: ASTM E165/E165M.
      - b. Magnetic Particle Inspection: ASTM E709, performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not acceptable.
      - c. Ultrasonic Inspection: ASTM E164.
      - d. Radiographic Inspection: ASTM E94/E94M.
  - J. At the completion of erection, the approved Erector shall submit a certificate of compliance to the Owner stating that the materials supplied and work performed by the Erector are in accordance with the Contract Documents.
- 3.4 FIELD CONNECTIONS
- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
    1. Joint Type: Snug tightened.
  - B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
    1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
    2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in ANSI/AISC 303 for mill material.

3.5 PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing, and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 051200

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Load bearing wall framing.
2. Exterior non-load bearing wall framing.
3. Interior non-load bearing wall framing exceeding height limitations of standard, non-structural metal framing.
4. Soffit framing.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for interior non-load bearing, metal-stud-framed, shaft-wall assemblies, with height limitations.
3. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

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

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

- C. Delegated-Design Submittal: For cold-formed steel framing.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency.
- B. Welding certificates.
- C. Product Certificates: For each type of code-compliance certification for studs and tracks.
- D. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.
  - 1. Steel sheet.
  - 2. Expansion anchors.
  - 3. Power-actuated anchors.
  - 4. Mechanical fasteners.
  - 5. Vertical deflection clips.
  - 6. Horizontal drift deflection clips
  - 7. Miscellaneous structural clips and accessories.
- E. Evaluation Reports: For non-standard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association or the Steel Stud Manufacturers Association.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AllSteel & Gypsum Products, Inc.
  - 2. ClarkDietrich.

3. Craco Manufacturing, Inc.
4. Custom Stud.
5. Formetal Co. Inc. (The).
6. Jaimes Industries.
7. MarinoWARE.
8. MBA Building Supplies.
9. MRI Steel Framing, LLC.
10. Nuconsteel, A Nucor Company.
11. Southeastern Stud & Components, Inc.
12. State Building Products, Inc.
13. Steel Construction Systems.
14. Steel Structural Systems.
15. Super Stud Building Products Inc.
16. Telling Industries.
17. The Steel Network, Inc.
18. United Steel Deck, Inc.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
  1. Design Loads: As indicated on Drawings.
  2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    - a. Exterior Load bearing Wall Framing: Horizontal deflection of 1/240 of the wall height. Increase limit to 1/600 of the wall height at locations backing up brick façade.
    - b. Interior Load bearing Wall Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft.
    - c. Exterior Non-Load bearing Framing: Horizontal deflection of 1/240 of the wall height. Increase limit to 1/600 of the wall height at locations backing up brick façade.
    - d. Interior Non-Load bearing Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft.
  3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 80 deg F.
  4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
    - a. Upward and downward movement of 3/4 inch.
  5. Design exterior non-load bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

- C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
  - 1. Wall Studs: AISI S211.
  - 2. Headers: AISI S212.
- D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

### 2.3 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
  - 1. Grade: As required by structural performance.
  - 2. Coating: G60, A60, AZ50, or GF30.
- B. Steel Sheet for Vertical Deflection Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:
  - 1. Grade: As required by structural performance.
  - 2. Coating: G60.

### 2.4 LOAD BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0428 inch.
  - 2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0428 inch.
  - 2. Flange Width: 1-1/4 inches.
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0428 inch.
  - 2. Flange Width: 1-5/8 inches.

## 2.5 EXTERIOR NON-LOAD BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0428 inch.
  2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0428 inch.
  2. Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AllSteel & Gypsum Products, Inc.
    - b. ClarkDietrich.
    - c. MarinoWARE.
    - d. Simpson Strong-Tie Co., Inc.
    - e. Steel Construction Systems.
    - f. The Steel Network, Inc.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
1. Minimum Base-Metal Thickness: 0.0428 inch.
  2. Flange Width: 1 inch plus the design gap for one-story structures.
- E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

## 2.6 INTERIOR NON-LOAD BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0329 inch.
  2. Flange Width: 1-3/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
  2. Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. AllSteel & Gypsum Products, Inc.
    - b. ClarkDietrich.
    - c. MarinoWARE.
    - d. Simpson Strong-Tie Co., Inc.
    - e. The Steel Network, Inc.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
1. Minimum Base-Metal Thickness: 0.0428 inch.
  2. Flange Width: 1 inch plus the design gap for one-story structures.
- E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

## 2.7 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0428 inch.
  2. Flange Width: 1-5/8 inches, minimum.

## 2.8 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
1. Supplementary framing.
  2. Bracing, bridging, and solid blocking.
  3. Web stiffeners.
  4. Anchor clips.
  5. End clips.



6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole-reinforcing plates.
11. Backer plates.

## 2.9 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.
- C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193, ICC-ES AC58, or ICC-ES AC308 as appropriate for the substrate.
  1. Uses: Securing cold-formed steel framing to structure.
  2. Type: Screw or adhesive anchor.
  3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
  4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.
- D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
  1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

## 2.10 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M or SSPC-Paint 20.
- B. Non-metallic, Non-shrink Grout: Factory-packaged, non-metallic, non-corrosive, non-staining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.
- C. Shims: Load bearing, high-density, multi-monomer, non-leaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4-inch-thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

## 2.11 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate framing assemblies using jigs or templates.
  - 2. Cut framing members by sawing or shearing; do not torch cut.
  - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.
  - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:
  - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

## 3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.
- C. Install load bearing shims or grout between the underside of load bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

## 3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
  - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
  - 1. Cut framing members by sawing or shearing; do not torch cut.
  - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

- G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

### 3.4 LOAD BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
  - 1. Anchor Spacing: As shown on Shop Drawings.
- B. Squarely seat studs against top and bottom tracks, with gap not exceeding 1/8 inch between the end of wall-framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
  - 1. Stud Spacing: As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
  - 1. Frame wall openings with not less than a double stud at each jamb of frame. Fasten jamb members together to uniformly distribute loads.
  - 2. Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. Install horizontal bridging in stud system, spaced vertically as indicated on Shop Drawings. Fasten at each stud intersection.
    1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches deep.
    2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges, and secure solid blocking to stud webs or flanges.
    3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
  - J. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.5 EXTERIOR NON-LOAD BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to bottom track unless otherwise indicated. Space studs as follows:
  1. Stud Spacing: As indicated on Drawings.
- C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- D. Isolate non-load bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  1. Install single deep-leg deflection tracks and anchor to building structure.
  2. Connect vertical deflection clips to bypassing studs and anchor to building structure.
  3. Connect drift clips to cold-formed steel framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
  1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
  2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
  - 1. Install solid blocking at centers indicated on Shop Drawings.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

### 3.6 INTERIOR NON-LOAD BEARING WALL INSTALLATION

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

3.7 ERECTION TOLERANCES

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

3.8 FIELD QUALITY CONTROL

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

3.9 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

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**SECTION 05 50 00  
METAL FABRICATIONS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Shop fabricated steel items.
- B. Steel framing and supports for applications where framing and supports are not specified in other Sections.

**1.02 REFERENCE STANDARDS**

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.
- E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.
- F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021a.
- H. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2020.
- J. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).
- L. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).
- M. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172; 2019.
- N. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- O. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).
- P. SSPC-SP 2 - Hand Tool Cleaning; 2018.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
  - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

**1.04 QUALITY ASSURANCE**

- A. Design supports 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: A qualified steel fabricator that is accredited by IAS AC172.

**PART 2 PRODUCTS****2.01 MATERIALS - STEEL**

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- E. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

**2.02 FABRICATION**

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- E. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

**2.03 FABRICATED ITEMS**

- A. Lintels: As detailed; prime paint finish.

**2.04 FINISHES - STEEL**

- A. Prime paint steel items.
  - 1. Exceptions: Galvanize items to be embedded in concrete and items to be imbedded in masonry.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

**2.05 FABRICATION TOLERANCES**

- A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).
- C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).
- D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).
- E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

**3.02 PREPARATION**

- A. Clean and strip primed steel items to bare metal where site welding is required.

**3.03 INSTALLATION**

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on shop drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.

**3.04 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

**END OF SECTION**

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**SECTION 05 51 33  
METAL LADDERS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Shop-fabricated metal ladders.

**1.02 REFERENCE STANDARDS**

- A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008 (Reaffirmed 2018).
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- D. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2021.
- E. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2023).
- G. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).
- H. SSPC-SP 2 - Hand Tool Cleaning; 2018.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
  - 1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

**1.04 QUALITY ASSURANCE**

- A. Design ladder under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State in which the Project is located.

**PART 2 PRODUCTS****2.01 MATERIALS - STEEL**

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Mechanical Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Bolts, Nuts, and Washers: ASTM A307, plain.
- E. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

**2.02 FABRICATION**

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

### **2.03 FABRICATED LADDERS**

- A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
  - 1. Side Rails: 3/8 by 2 inches (9 by 50 mm) members spaced at 20 inches (500 mm).
  - 2. Rungs: One inch (25 mm) diameter solid round bar spaced 12 inches (300 mm) on center.
  - 3. Space rungs 7 inches (175 mm) minimum from wall surface.

### **2.04 FINISHES - STEEL**

- A. Prime paint steel items.
  - 1. Do not prime surfaces where field welding is required.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.

### **2.05 FABRICATION TOLERANCES**

- A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).
- C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).
- D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).
- E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

### **3.02 INSTALLATION**

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components as indicated on shop drawings.
- D. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection, prime welds, abrasions, and surfaces not shop primed .

**END OF SECTION**

**SECTION 05 52 13  
PIPE AND TUBE RAILINGS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Free-standing railings.

**1.02 REFERENCE STANDARDS**

- A. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2022.
- B. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021a.
- C. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2021.
- D. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.
- E. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 1999 (Ed. 2004).

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated within the previous 12 months.

**1.04 QUALITY ASSURANCE**

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
- B. Fabricator Qualifications:
  - 1. A company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

**PART 2 PRODUCTS****2.01 RAILINGS - GENERAL REQUIREMENTS**

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.
- B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot (1095 N/m) applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
- C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds (890 N) applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
- D. Allow for expansion and contraction of members and building movement without damage to connections or members.
- E. Dimensions: See drawings for configurations and heights.
  - 1. Top Rails and Wall Rails: 1-1/2 inches (38 mm) diameter, round.
  - 2. Intermediate Rails: 1-1/2 inches (38 mm) diameter, round.
  - 3. Posts: 1-1/2 inches (38 mm) diameter, round.
- F. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

**2.02 STEEL RAILING SYSTEM**

- A. Steel Tube: ASTM A500/A500M Grade B cold-formed structural tubing.
- B. Steel Pipe: ASTM A53/A53M Grade B Schedule 80, black finish.
- C. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- D. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

**2.03 FABRICATION**

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
  - 1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
  - 2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
  - 3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

**2.04 STEEL FINISHES**

- A. Shop primed and field painted.
  - 1. Color: As selected by Architect.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

**3.02 PREPARATION**

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

**3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Anchor railings securely to structure.

**3.04 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

**END OF SECTION**



## SECTION 061000 - ROUGH CARPENTRY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Framing with dimension lumber.
- 2. Framing with engineered wood products.
- 3. Wood blocking and nailers.

- B. Related Requirements:

- 1. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.
- 2. Section 061753 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.
- 3. Section 313116 "Termite Control" for site application of borate treatment to wood framing.

#### 1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. OSB: Oriented strand board.
- E. Timber: Lumber of 5 inches nominal size or greater in least dimension.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.

2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Sustainable Design Submittals:

1. Environmental Product Declaration: For each product.
2. Health Product Declaration: For each product.
3. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
4. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
5. Chain-of-Custody Qualification Data: For manufacturer and vendor.
6. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
  1. Wood-preservative-treated wood.
  2. Fire-retardant-treated wood.
  3. Engineered wood products.
  4. Power-driven fasteners.
  5. Post-installed anchors.
  6. Metal framing anchors.

## 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- B. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- C. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

## PART 2 - PRODUCTS

## 2.1 WOOD PRODUCTS, GENERAL

- A. Regional Materials: The following wood products shall be manufactured within 100 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site. Coordinate list below with products retained.
  - 1. Dimension lumber.
  - 2. Laminated-veneer lumber.
  - 3. Parallel-strand lumber.
  - 4. Prefabricated wood I-joists.
  - 5. Rim boards.
- B. Certified Wood: The following wood products shall be certified as "FSC Mixed Credit" according to FSC STD-01-001 and FSC STD-40-004. Coordinate list below with products retained.
  - 1. Dimension lumber.
  - 2. Laminated-veneer lumber.
  - 3. Parallel-strand lumber.
  - 4. Prefabricated wood I-joists.
  - 5. Rim boards.
- C. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
  - 3. Dress lumber, S4S, unless otherwise indicated.
- D. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.
- E. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground and use Category UC3b for exterior construction not in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  - 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
  - 1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
  - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  - 4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
  - 5. Wood floor plates that are installed over concrete slabs-on-grade.

## 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Treatment shall not promote corrosion of metal fasteners.
  - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to

- accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
  4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664 and design value adjustment factors shall be calculated according to ASTM D6841.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by testing agency.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings, and the following:
1. Framing for raised platforms.
  2. Framing for stages.
- 2.4 DIMENSION LUMBER FRAMING
- A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.
1. Application: Interior partitions not indicated as load bearing.
  2. Species:
    - a. Hem-fir (north); NLGA.
    - b. Spruce-pine-fir; NLGA.
- B. Load-Bearing Partitions: No. 2 grade.
1. Application: Exterior walls and interior load-bearing partitions.
  2. Species:
    - a. Hem-fir (north); NLGA.
    - b. Spruce-pine-fir; NLGA.
    - c. Douglas fir-larch (north); NLGA.
- C. Ceiling Joists: Construction or No. 2 grade.
1. Species:
    - a. Hem-fir (north); NLGA.
    - b. Douglas fir-larch (north); NLGA.

- c. Spruce-pine-fir; NLGA.
- D. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade.
- 1. Species:
    - a. Hem-fir (north); NLGA.
    - b. Spruce-pine-fir; NLGA.
    - c. Douglas fir-larch (north); NLGA.
- E. Built-Up Timber Truss & Exterior Cladding at Drop-Off: No. 2 grade.
- 1. Species:
    - a. Western Red Cedar; (WCLIB WWPA)
- F. Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
- 1. Species and Grade: As indicated above for load-bearing construction of same type.

## 2.5 ENGINEERED WOOD PRODUCTS

- A. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
- B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.
- C. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Finnforest USA.
    - b. Georgia-Pacific Gypsum LLC.
    - c. Louisiana-Pacific Corporation.
    - d. Stark Truss Company, Inc.
    - e. Weyerhaeuser Company.
  - 2. Extreme Fiber Stress in Bending, Edgewise: 2600 psi for 12-inch nominal- depth members.
  - 3. Modulus of Elasticity, Edgewise: 2,000,000 psi.

- D. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Louisiana-Pacific Corporation.
    - b. Weyerhaeuser Company.
  2. Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal- depth members.
  3. Modulus of Elasticity, Edgewise: 2,000,000 psi.
- E. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Comply with material requirements of and with structural capacities established and monitored according to ASTM D5055.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Anthony-Domtar Inc.
    - b. Georgia-Pacific Gypsum LLC.
    - c. International Beams Inc.
    - d. International Paper Corporation.
    - e. J. M. Huber Corporation.
    - f. Louisiana-Pacific Corporation.
    - g. Stark Truss Company, Inc.
    - h. Superior Wood Systems.
    - i. Weyerhaeuser Company.
  2. Web Material: Either OSB or plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1.
  3. Structural Properties: Depths and design values not less than those indicated.
  4. Comply with APA PRI-400. Factory mark I-joists with APA-EWS trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA-EWS standard.
- F. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research or evaluation report for I-joists.
1. Manufacturer: Provide products by same manufacturer as I-joists.
  2. Material: All-veneer product or product made from any combination solid lumber, wood strands, and veneers.
  3. Thickness: 1-1/4 inches.
  4. Comply with APA PRR-401, rim board plus grade. Factory mark rim boards with APA-EWS trademark indicating thickness, grade, and compliance with APA-EWS standard.

## 2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Cants.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

## 2.7 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B633, Class Fe/Zn 5.

## 2.8 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Cleveland Steel Specialty Co.
  - 2. Phoenix Metal Products, Inc.
  - 3. Simpson Strong-Tie Co., Inc.
  - 4. USP Structural Connectors.



- B. Allowable design loads, as published by manufacturer, shall meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.
  - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
  - 1. Use for wood-preservative-treated lumber and where indicated.
- E. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
  - 1. Use for exterior locations and where indicated.

## 2.9 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- F. Do not splice structural members between supports unless otherwise indicated.

- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
  2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
  3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
  4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
1. Use inorganic boron for items that are continuously protected from liquid water.
  2. Use copper naphthenate for items not continuously protected from liquid water.
- K. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
  2. ICC-ES evaluation report for fastener.
- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- M. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
1. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

## 3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

## 3.3 INSTALLATION OF WALL AND PARTITION FRAMING

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions. Fasten plates to supporting construction unless otherwise indicated.
  - 1. For all walls, provide wood studs as indicated on the Drawings.
  - 2. Provide continuous horizontal blocking at mid-height of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
  - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
  - 2. For exterior and load-bearing walls, provide jamb studs and headers as indicated on the Drawings.

## 3.4 INSTALLATION OF FLOOR JOIST FRAMING

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists as follows:
  - 1. Where supported on wood members, by using metal framing anchors.
  - 2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Fire Cuts: At joists built into masonry, bevel cut ends 3 inches and do not embed more than 4 inches.
- C. Frame openings with double headers and trimmers supported by metal joist hangers; headers and trimmers as indicated on the Drawings where span of header exceeds 48 inches.

- D. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than one-third depth of joist; do not locate closer than 2 inches from top or bottom.
- E. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.
- F. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.
- G. Anchor members paralleling masonry with 1/4-by-1-1/4-inch metal strap anchors spaced not more than 96 inches o.c., extending over and fastening to three joists. Embed anchors at least 4 inches into grouted masonry with ends bent at right angles and extending 4 inches beyond bend.
- H. Provide solid blocking between joists under jamb studs for openings.
- I. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
  - 1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.
- J. Provide bridging of type indicated below, at intervals of 96 inches o.c., between joists.
  - 1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal-size lumber, double-crossed and nailed at both ends to joists.
  - 2. Steel bridging installed to comply with bridging manufacturer's written instructions.

### 3.5 INSTALLATION OF CEILING JOIST AND RAFTER FRAMING

- A. Ceiling Joists: Install with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
- B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
  - 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
  - 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal-size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.6 INSTALLATION OF STAIR FRAMING

- A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:
  - 1. Size: 2-by-12-inch nominal size, minimum.
  - 2. Material: solid lumber.
  - 3. Notching: Notch rough carriages to receive treads, risers, and supports; leave at least 3-1/2 inches of effective depth.
  - 4. Spacing: At least three framing members for each 36-inch clear width of stair.
- B. Provide stair framing with no more than 3/16-inch variation between adjacent treads and risers and no more than 3/8-inch variation between largest and smallest treads and risers within each flight.

3.7 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

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**SECTION 06 10 00  
ROUGH CARPENTRY****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Roofing nailers.
- B. Preservative treated wood materials.
- C. Fire retardant treated wood materials.
- D. Communications and electrical room mounting boards.
- E. Concealed wood blocking, nailers, and supports.
- F. 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; 2023.
- B. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing; 2003 (Reapproved 2017).
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- D. AWPA U1 - Use Category System: User Specification for Treated Wood; 2023.
- E. PS 1 - Structural Plywood; 2023.
- F. PS 20 - American Softwood Lumber Standard; 2021.
- G. 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 and application instructions.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

**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.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

**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.
- B. Lumber fabricated from old growth timber is not permitted.

**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. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Lumber: S4S, No. 2 or Standard Grade.
  - 2. Boards: Standard or No. 3.

**2.03 CONSTRUCTION PANELS**

- A. 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.

**2.04 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.

**2.05 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. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
  - 2. 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. Fire Retardant Treatment:
  - 1. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
    - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
    - b. Treat rough carpentry items as indicated .
    - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. 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 masonry or concrete.
  - 2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
    - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.

**PART 3 EXECUTION****3.01 PREPARATION**

- A. Coordinate installation of rough carpentry members specified in other sections.

**3.02 INSTALLATION - GENERAL**

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.



- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

### **3.03 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 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.
- C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- D. Specifically, provide blocking and framing for the proper installation of the following:
  - 1. Cabinets and shelf supports.
  - 2. Wall brackets.
  - 3. Handrails.
  - 4. Grab bars.
  - 5. Towel and bath accessories.
  - 6. Wall-mounted door stops.
  - 7. Televisions.
- E. 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.

### **3.04 INSTALLATION OF CONSTRUCTION PANELS**

- A. 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. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
  - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
  - 3. Install adjacent boards without gaps.
  - 4. Size and Location: As indicated on drawings.

### **3.05 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.

### **3.06 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 15 00  
WOOD DECKING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Softwood lumber structural wood decking.
- B. Preservative treatment of wood.

**1.02 REFERENCE STANDARDS**

- A. AWC WCD2 - Tongue and Groove Roof Decking; 2003.
- B. SPIB (GR) - Standard Grading Rules; 2021.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

**1.04 QUALITY ASSURANCE**

- A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least three years of documented experience and certified by AITC.
- C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with at least three years of documented experience.

**PART 2 PRODUCTS****2.01 WOOD MATERIALS**

- A. Lumber Decking: Fabricated to AWC WCD2.
  - 1. Species: \_\_\_\_\_, graded under SPIB (GR) rules as AITC Select quality.
  - 2. Size: 2 by 6 inches (50 by 300 mm), nominal.
  - 3. Moisture Content: 19 percent, maximum.
  - 4.

**2.02 ACCESSORIES**

- A. Fasteners and Anchors:
  - 1. Fastener Type and Finish: Hot-dipped galvanized steel for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
  - 2. Fastener Type and Finish for Composite Decking: Stainless steel, trim head.
  - 3. Screws: Bugle head, hardened steel, power driven type, length three times thickness of decking.

**2.03 WOOD TREATMENT**

- A. Factory-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.
- B. Preservative Pressure Treatment:
  - 1. Preservative Pressure Treatment of Lumber Decking: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention ( to 4.0 kg/cu m retention).
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
- C. Surface-Applied Wood Preservative:

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that support framing is ready to receive decking.

**3.02 PREPARATION**

- A. Coordinate placement of bearing items.

**3.03 SITE APPLIED WOOD TREATMENT**

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

**3.04 INSTALLATION - BOARD DECKING**

- A. Install decking perpendicular to framing members, with ends staggered over firm bearing. On sloped surfaces, lay decking with tongue upward.
- B. Fit butt end deck joints occurring between support members with metal splines to maintain tight, aligned joints.
- C. Secure with fasteners. Side spike planks together, through pre-drilled holes.
- D.

**3.05 TOLERANCES**

- A. Surface Flatness of Decking Without Load: 1/4 inch in 10 feet (2 mm/m) maximum, and 1/2 inch in 30 feet (12 mm / 9 m) maximum.

**END OF SECTION**

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.
4. Subflooring.
5. Underlayment.
6. Sheathing joint and penetration treatment.

B. Related Requirements:

1. Section 072500 "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier and water-resistant glass-mat gypsum sheathing requirements and installation, special details, transitions, mockups, air-leakage testing, protection, and work scheduling that covers air-barrier and water-resistant glass-mat gypsum sheathing.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.

3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

B. Sustainable Design Submittals:

1. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.
2. Chain-of-Custody Qualification Data: For manufacturer and vendor.
3. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
4. Product Data: For installation adhesives, indicating VOC content.
5. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For air-barrier and water-resistant glass-mat gypsum sheathing assemblies.

1. Show locations and extent of sheathing, accessories, and assemblies specific to Project conditions.
2. Include details for sheathing joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
3. Include details of interfaces with other materials that form part of air barrier.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, including list of ABAA-certified installers and supervisors employed by Installer, who work on Project and testing and inspecting agency.
- B. Product Certificates: From air-barrier and water-resistant glass-mat gypsum sheathing manufacturer, certifying compatibility of sheathing accessory materials with Project materials that connect to or that come in contact with the sheathing.
- C. Product Test Reports: For each air-barrier and water-resistant glass-mat gypsum sheathing assembly, indicating compliance with specified requirements, for tests performed by a qualified testing agency.
- D. Evaluation Reports: For the following, from ICC-ES:
  1. Wood-preservative-treated plywood.
  2. Fire-retardant-treated plywood.
  3. Air-barrier and water-resistant glass-mat gypsum sheathing.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of air-barrier and water-resistant glass-mat gypsum sheathing.

1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.
- B. Testing Agency Qualifications:
  1. For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
- C. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- D. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- B. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing Performance: Air-barrier and water-resistant glass-mat gypsum sheathing assembly, and seals with adjacent construction, shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, tie-ins to other installed air barriers, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

### 2.2 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- B. Certified Wood: The following wood products shall be certified as "FSC Pure" according to FSC STD-01-001 and FSC STD-40-004.
  - 1. Plywood.
  - 2. Oriented strand board.
  - 3. Particleboard underlayment.
  - 4. Hardboard underlayment.
- C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- D. Factory mark panels to indicate compliance with applicable standard.

### 2.3 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with ground, and use Category UC3b for exterior construction not in contact with ground.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings.

### 2.4 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Use treatment that does not promote corrosion of metal fasteners.
  - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
  - 3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D5516 and design value adjustment factors shall be calculated according to ASTM D6305. Span ratings after treatment shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.



- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings.

## 2.5 WALL SHEATHING

- A. Plywood Sheathing: DOC PS 1, Exterior sheathing.
  - 1. Span Rating: Not less than 24/16.
  - 2. Nominal Thickness: Not less than 7/16 inch.
- B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1 sheathing.
  - 1. Span Rating: Not less than 24/16.
  - 2. Nominal Thickness: Not less than 7/16 inch.
- C. Glass-Mat Gypsum Sheathing: ASTM C1177/C1177M.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. CertainTeed Corporation.
    - b. CertainTeed Gypsum.
    - c. Continental Building Products, LLC.
    - d. Georgia-Pacific Gypsum LLC.
    - e. National Gypsum Company.
    - f. USG Corporation.
  - 2. Type and Thickness: Regular, 1/2 inch thick.
  - 3. Size: 48 by 96 inches for vertical installation.

## 2.6 ROOF SHEATHING

- A. Plywood Sheathing: DOC PS 1, Exterior sheathing.
  - 1. Span Rating: Not less than 40/20.
  - 2. Nominal Thickness: Not less than 19/32 inch.
- B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1 sheathing.
  - 1. Span Rating: Not less than 40/20.
  - 2. Nominal Thickness: Not less than 19/32 inch.

## 2.7 PARAPET SHEATHING

- A. Plywood Sheathing: DOC PS 1, Exterior sheathing.
  - 1. Span Rating: Not less than 24/16.

2. Nominal Thickness: Not less than 7/16 inch.

B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1 sheathing.

1. Span Rating: Not less than 24/16.
2. Nominal Thickness: Not less than 7/16 inch.

## 2.8 SUBFLOORING AND UNDERLAYMENT

A. Plywood Subflooring: DOC PS 1, Exposure 1 single-floor panels or sheathing.

1. Span Rating: Not less than 48/24.
2. Nominal Thickness: Not less than 23/32 inch.

B. Oriented-Strand-Board Subflooring: DOC PS 2, Exposure 1 single-floor panels or sheathing.

1. Span Rating: Not less than 48/24.
2. Nominal Thickness: Not less than 23/32 inch.

C. Underlayment: Provide underlayment in nominal thicknesses indicated or, if not indicated, not less than 1/4 inch over smooth subfloors and not less than 3/8 inch over board or uneven subfloors.

1. Plywood Underlayment for Resilient Flooring: DOC PS 1, Exposure 1 Underlayment with fully sanded face.
2. Plywood Underlayment for Ceramic Tile: DOC PS 1, Exterior, C-C Plugged, not less than 5/8-inch nominal thickness.
3. Plywood Underlayment for Carpet: DOC PS 1, Exposure 1, Underlayment.

## 2.9 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof, parapet, and exterior wall] sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
2. For roof, parapet, and exterior wall sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.

## 2.10 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

## 2.11 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Wood Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
1. Adhesive shall have a VOC content of 70 g/L or less.
  2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

## PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
  2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.
  3. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

- E. Coordinate wall, parapet, and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

### 3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Subflooring:
    - a. Glue and nail to wood framing.
    - b. Screw to cold-formed metal framing.
    - c. Space panels 1/8 inch apart at edges and ends.
  - 2. Wall and Roof Sheathing:
    - a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
    - b. Screw to cold-formed metal framing.
    - c. Space panels 1/8 inch apart at edges and ends.
  - 3. Underlayment:
    - a. Nail or staple to subflooring.
    - b. Space panels 1/32 inch apart at edges and ends.
    - c. Fill and sand edge joints of underlayment receiving resilient flooring immediately before installing flooring.

### 3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
  - 1. Fasten gypsum sheathing to wood framing with nails or screws.
  - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
  - 3. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
  - 4. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
  2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
  2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- E. Seal sheathing joints according to sheathing manufacturer's written instructions.
1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.
- F. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing:
1. Install accessory materials according to sheathing manufacturer's written instructions and details to form a seal with adjacent construction, to seal fasteners, and ensure continuity of air and water barrier.
    - a. Coordinate the installation of sheathing with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
    - b. Install transition strip on roofing membrane or base flashing, so that a minimum of 3 inches of coverage is achieved over each substrate.
  2. Connect and seal sheathing material continuously to air barriers specified under other Sections as well as to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
  3. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
  4. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip, so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.

- a. Transition Strip: Roll firmly to enhance adhesion.
  - b. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
- 
5. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of sheathing material with foam sealant.
  6. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
  7. Seal top of through-wall flashings to sheathing with an additional 6-inch-wide, transition strip.
  8. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
  9. Repair punctures, voids, and deficient lapped seams in strips and transition strips extending 6 inches beyond repaired areas in strip direction.

### 3.4 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

END OF SECTION 061600

**SECTION 06 20 00  
FINISH CARPENTRY****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Finish carpentry items.
- B. Wood casings and moldings.
- C. Exterior finish lumber.

**1.02 REFERENCE STANDARDS**

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data:
  - 1. Provide instructions for attachment hardware.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- D. Samples: Submit two samples of wood trim 6 inch (150 mm) long.

**1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.
- B. Protect from moisture damage.
- C. Handle materials and products to prevent damage to edges, ends, or surfaces.

**PART 2 PRODUCTS****2.01 FINISH CARPENTRY ITEMS**

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

**2.02 LUMBER MATERIALS**

- A. Softwood Lumber: Western Red Cedar No. 2 species, quarter sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.

**2.03 FASTENINGS**

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- B. Fasteners: Of size and type to suit application; surface finish in concealed locations and countersunk finish in exposed locations.

**2.04 ACCESSORIES**

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Wood Filler: Solvent base, tinted to match surface finish color.

**2.05 SITE FINISHING MATERIALS**

- A. Stain, Shellac, Varnish, and Finishing Materials: Comply with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Field Finishing: See Section 09 93 00.

**2.06 FABRICATION**

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- C. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

**3.02 INSTALLATION**

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

**3.03 PREPARATION FOR SITE FINISHING**

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Site Finishing: See Section 09 93 00.

**3.04 TOLERANCES**

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

**END OF SECTION**



**SECTION 06 41 00  
ARCHITECTURAL WOOD CASEWORK****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Specially fabricated cabinet units.
- B. Countertops.
- C. Hardware.
- D. Factory finishing.
- E. Preparation for installing utilities.

**1.02 REFERENCE STANDARDS**

- A. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- B. BHMA A156.9 - Cabinet Hardware; 2020.
- C. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than 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. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches (300 mm) square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- E. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

**1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
  - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
  - 2. Single Source Responsibility: Provide and install this work from single fabricator.

**1.06 MOCK-UPS**

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.
- B. Locate where directed.
- C. Mock-up may remain as part of the work.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Protect units from moisture damage.

**1.08 FIELD CONDITIONS**

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Single Source Responsibility: Provide and install this work from single fabricator.

**2.02 CABINETS**

- A. Quality Standard: Premium Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Cabinets:
  - 1. Finish - Exposed Exterior Surfaces: Decorative laminate.
  - 2. Finish - Exposed Interior Surfaces: Decorative laminate.
  - 3. Finish - Semi-Exposed Surfaces: Decorative laminate
  - 4. Finish - Concealed Surfaces: Manufacturer's option.
  - 5. Door and Drawer Front Edge Profiles: Decorative laminate.
  - 6. Casework Construction Type: Type A - Frameless.
  - 7. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
    - a. Premium Grade:
      - 1) Provide vertical run and match for doors, drawer fronts and false fronts within each cabinet unit and for entire project.
      - 2) Provide well-matched doors, drawer fronts and false fronts across multiple cabinet faces in one elevation.
      - 3) Cathedral Grain: Point grain crown up and run in the same direction for entire project.
  - 8. Adjustable Shelf Loading: 50 psf (24.4 gm/sq cm).
    - a. Deflection: L/144.
  - 9. Cabinet Style: Flush overlay.
  - 10. Cabinet Doors and Drawer Fronts: Flush style.
  - 11. Drawer Side Construction: Fabricator's option per AWI grade specified.
  - 12. Drawer Construction Technique: Fabricator's option per AWI grade specified.

**2.03 WOOD-BASED COMPONENTS**

- A. Wood fabricated from old growth timber is not permitted.

**2.04 LAMINATE MATERIALS**

- A. Manufacturers:
  - 1. Formica Corporation: [www.formica.com/#sle](http://www.formica.com/#sle).
  - 2. Panolam Industries International, Inc: [www.panolam.com/#sle](http://www.panolam.com/#sle).
  - 3. Wilsonart LLC: [www.wilsonart.com/#sle](http://www.wilsonart.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- C. Provide specific types as indicated.
  - 1. Vertical Surfaces: VGS, 0.028 inch (0.71 mm) nominal thickness, color as selected, finish as selected.
  - 2. Cabinet Liner: CLS, 0.020 inch (0.51 mm) nominal thickness, color as selected, finish as selected.
- D. Allow for twelve colors as selected by Architect from manufacturer's full range for laminate.

**2.05 COUNTERTOPS**

- A. Solid Surface Countertops: Specified in Section 06 65 10.

**2.06 ACCESSORIES**

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- D. Concealed Joint Fasteners: Threaded steel.

- E. Grommets: Standard plastic grommets for cut-outs, in color to match adjacent surface.

## 2.07 HARDWARE

- A. Hardware: BHMA A156.9, types as indicated for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated self rests, satin chrome finish, for nominal 1 inch (25 mm) spacing adjustments.
- C. Vanity Brackets: Fixed, ADA-compliant, face-of-stud mounting.
  - 1. Material and Shape: Steel; formed compound shapes.
    - a. Finish: Manufacturer's standard, factory-applied, textured powder coat.
    - b. Color: Black.
  - 2. Products:
    - a. A&M Hardware, Inc; ADA Vanity Brackets: [www.aandmhardware.com/#sle](http://www.aandmhardware.com/#sle).
    - b. Rakks/Rangine Corporation; ADA Compliant EHV Vanity Supports: [www.rakks.com/#sle](http://www.rakks.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Countertop Brackets: Fixed, concealed vertical leg, stud mounting.
  - 1. Materials: Steel L-shapes.
    - a. Finish: Manufacturer's standard, factory-applied, powder coat.
    - b. Color: Black.
  - 2. Products:
    - a. A&M Hardware, Inc; Concealed Brackets: [www.aandmhardware.com/#sle](http://www.aandmhardware.com/#sle).
    - b. Centerline Brackets; Floating Wall Mount: [www.countertopbracket.com/#sle](http://www.countertopbracket.com/#sle).
    - c. Rakks/Rangine Corporation; Inside Wall Flush Mount Brackets: [www.rakks.com/#sle](http://www.rakks.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Drawer and Door Pulls: "U" shaped wire pull, aluminum with satin finish, 4 inch centers ("U" shaped wire pull, aluminum with satin finish, 100 mm centers).
- F. Keyed Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.
  - 1. Install locks as indicated on plans and where not indicated provide two locks per upper and lower cabinet unit in each cabinet location.
    - a. Locate locks as directed by Architect.
- G. Cabinet Catches and Latches:
  - 1. Type: Magnetic catch.
- H. Drawer Slides:
  - 1. Type: Full extension.
  - 2. Static Load Capacity: As indicated below.
    - a. Standard Drawer Pound Class: 100.
    - b. File Drawer Pound Class: 150.
  - 3. Mounting: Side mounted.
  - 4. Stops: Integral type.
  - 5. Features: Provide self closing/stay closed type.
  - 6. Manufacturers:
    - a. Accuride International, Inc: [www accuride.com/#sle](http://www accuride.com/#sle).
    - b. Grass America Inc: [www.grassusa.com/#sle](http://www.grassusa.com/#sle).
    - c. Knappe & Vogt Manufacturing Company: [www.knappeandvogt.com/#sle](http://www.knappeandvogt.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- I. Hinges: European style concealed self-closing type, steel with nickel-plated finish.
  - 1. Manufacturers:
    - a. Blum, Inc: [www.blum.com/#sle](http://www.blum.com/#sle).
    - b. Grass America Inc: [www.grassusa.com/#sle](http://www.grassusa.com/#sle).
    - c. Hardware Resources: [www.hardwareresources.com/#sle](http://www.hardwareresources.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.

**2.08 FABRICATION**

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.
- E. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:
  - 1. Provide sequence matching across each elevation.
- F. Provide cutouts for plumbing fixtures, inserts, outlet boxes, and fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal cut edges.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

**3.02 INSTALLATION**

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim for this purpose.
- F. Secure cabinets and counter bases to floor using appropriate angles and anchorages.
- G. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

**3.03 ADJUSTING**

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

**3.04 CLEANING**

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

**END OF SECTION**

**SECTION 06 41 16**  
**ARCHITECTURAL PLASTIC LAMINATE CASEWORK****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Specially fabricated plastic laminate cabinet units.
- B. Countertops.
- C. Cabinet hardware.
- D. Preparation for installing utilities.

**1.02 REFERENCE STANDARDS**

- A. ANSI A135.4 - American National Standard for Basic Hardboard; 2004.
- B. ANSI A208.1 - American National Standard for Particleboard; 2009.
- C. ANSI A208.2 - American National Standard for Medium Density Fiberboard for Interior Use; 2009.
- D. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2005, 8th Ed., Version 2.0.
- E. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).
- F. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; Hardwood Plywood & Veneer Association; 2009 (ANSI/HPVA HP-1).
- G. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2005.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot (1:8).
- C. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.
- D. Product Data: Provide data for hardware accessories.
- E. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches (300 mm) square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.
- F. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

**1.05 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
  - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
- B. Perform work in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Custom quality, unless other quality is indicated for specific items.
- C. Perform cabinet construction in accordance with AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Custom quality, unless other quality is indicated for specific items.

- D. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

#### **1.06 MOCK-UP**

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware and finishes.
- B. Locate where directed.
- C. Mock-up may remain as part of the Work.

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

- A. Protect units from moisture damage.
- B. Deliver materials only when the project is ready for installation and the general contractor has provided a clean storage area.
  - 1. Delivery shall be made only when the area of installation is enclosed, dry, broom clean and ready for installation of cabinetry.

#### **1.08 FIELD CONDITIONS**

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Single Source Responsibility: Provide and install this work from single fabricator.

#### **2.02 CABINETS**

- A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI Architectural Woodwork Standards for Custom Grade.
- B. Cabinets :
  - 1. Finish - Exposed Exterior Surfaces: Decorative laminate.
  - 2. Finish - Exposed Interior Surfaces: Decorative laminate.
  - 3. Finish - Semi-Exposed Interior Surfaces: Decorative Laminate.
  - 4. Finish - Concealed Surfaces: Manufacturer's option.
  - 5. Door and Drawer Front Edge Profiles: Decorative Laminate.
  - 6. Casework Construction Type: Type A - Frameless.
  - 7. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
    - a. Custom Grade: Doors, drawer fronts and false fronts wood grain to run and match vertically within each cabinet unit.
  - 8. Adjustable Shelf Loading: 50 lbs. per sq. ft..
    - a. Deflection: L/144.
  - 9. Cabinet Style: Flush overlay.
  - 10. Cabinet Doors and Drawer Fronts: Flush style.
  - 11. Drawer Side Construction: Manufacturer's option per AWI grade specified.
  - 12. Drawer Construction Technique: Manufacturer's option per AWI grade specified.
- C. Casework Dimensions: Standard dimensions as indicated in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated unless noted otherwise on plans.

#### **2.03 WOOD-BASED COMPONENTS**

- A. Wood fabricated from old growth timber is not permitted.

#### **2.04 PANEL MATERIALS**

- A. Particleboard: ANSI A208.1; medium density industrial type as specified in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, composed of wood chips bonded with interior grade adhesive under heat and pressure; sanded faces; thickness as indicated; use for components indicated on drawings.

- B. Medium Density Fiberboard (MDF): ANSI A208.2; type as specified in AWI/AWMAC Architectural Woodwork Quality Standards Illustrated; composed of wood fibers pressure bonded with moisture resistant adhesive to suit application; sanded faces; thickness as indicated.
  - 1. Use as backing for plastic laminate unless otherwise indicated.

## 2.05 LAMINATE MATERIALS

- A. Manufacturers:
  - 1. Formica Corporation: [www.formica.com](http://www.formica.com).
  - 2. Panolam Industries International, Inc\Nevamar: [www.nevamar.com](http://www.nevamar.com).
  - 3. Wilsonart International, Inc: [www.wilsonart.com](http://www.wilsonart.com).
  - 4. Substitutions: See Section 01 6000 - Product Requirements.
- B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications and as follows:
  - 1. Horizontal Surfaces: HGS, 0.048 inch (1.22 mm) nominal thickness, color as selected, finish as selected.
  - 2. Vertical Surfaces: VGS, 0.028 inch (0.71 mm) nominal thickness, color as selected, finish as selected.
  - 3. Cabinet Liner: CLS, 0.020 inch (0.51 mm) nominal thickness, color as selected, finish as selected.

## 2.06 COUNTERTOPS

- A. Plastic Laminate Countertops: Medium density fiberboard substrate covered with HPDL, conventionally fabricated and self-edge banded.
  - 1. Provide MR MDF at all countertops with sinks.

## 2.07 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- D. Concealed Joint Fasteners: Threaded steel.
- E. Grommets: Standard plastic grommets for cut-outs, in color to match adjacent surface.

## 2.08 HARDWARE

- A. Hardware: BHMA A156.9, types as indicated for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated self rests, satin chrome finish, for nominal 1 inch (25 mm) spacing adjustments.
  - 1. Locations: Typical all shelf locations unless noted otherwise.
- C. Adjustable Locking Shelf Supports: Standard side-mounted system using multiple holes for pin supports and coordinated locking shelf rests, plastic, for nominal 1 inch (25 mm) spacing adjustments.
  - 1. Color: As selected by Architect from manufacturer's full range.
  - 2. Locations: Typical at all locations indicated.
- D. Drawer and Door Pulls: Bow shaped wire pull, aluminum, 4 3/8 inch overall.
  - 1. Finish: As selected by Architect from manufacturer's full range.
- E. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with satin finish.
  - 1. Install locks as indicated on plans and where not indicated provide two locks per upper and lower cabinet unit in each cabinet location.
    - a. Locate locks as directed by Architect.
    - b. Furnish and install twenty locks minimum.
- F. Catches: Magnetic.

- G. Drawer Slides:
  - 1. Type: Full extension ball bearing.
  - 2. Static Load Capacity: As indicated below.
    - a. Standard Drawer Pound Class: 100.
    - b. File Drawer Pound Class: 150.
  - 3. Mounting: Side mounted.
  - 4. Stops: Integral type.
  - 5. Products:
    - a. Accuride International, Inc: [www accuride.com](http://www accuride.com).
    - b. Grass America Inc: [www grassusa.com](http://www grassusa.com).
    - c. Knappe & Vogt Manufacturing Company: [www knapeandvogt.com](http://www knapeandvogt.com).
    - d. Substitutions: See Section 01 6000 - Product Requirements.
- H. Hinges: European style concealed self-closing type, steel with satin finish.
  - 1. Products:
    - a. Grass America Inc: [www grassusa.com](http://www grassusa.com).
    - b. Hardware Resources: [www hardwareresources.com](http://www hardwareresources.com).
    - c. Julius Blum, Inc: [www blum.com](http://www blum.com).
    - d. Substitutions: See Section 01 6000 - Product Requirements.

## 2.09 FABRICATION

- A. Cabinet Style: Flush overlay.
- B. Cabinet Doors and Drawer Fronts: Flush style.
- C. Drawer Construction Technique: Any allowed by AWI grade specified .
- D. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- E. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- F. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- G. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs. (Locate counter butt joints minimum 600 mm from sink cut-outs.)
- H. Provide cutouts for plumbing fixtures, inserts, outlet boxes, and fixtures and fittings. Verify locations of cutouts from on-site dimensions. Seal cut edges.
- I. Shop prepare and identify components of assemblies for matching during site assembly.
- J. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

### 3.02 INSTALLATION

- A. Use fixture attachments in concealed locations for wall mounted components.
- B. Use concealed joint fasteners to align and secure adjoining cabinet units and countertops.
- C. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (1 mm). Do not use additional overlay trim for this purpose.
- D. Secure cabinets and counter bases to floor using appropriate angles and anchorages.



- E. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.
- F. Install work in accordance with Premium grade, Section 1700, QSI.

**3.03 ADJUSTING**

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

**3.04 CLEANING**

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

**END OF SECTION**

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**SECTION 06 53 00  
PLASTIC DECKING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Plastic decking.

**1.02 REFERENCE STANDARDS**

- A. ASTM D7032 - Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards, and Handrails; 2021.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's descriptive literature for each specified product.
- C. Shop Drawings: Indicate deck framing system, loads and cambers, bearing details, and framed openings.
- D. Samples: Submit two samples, \_\_\_by\_\_\_ inch (\_\_\_by\_\_\_ mm) in size illustrating texture and finish.
- E. Evaluation Service Reports: Documentation indicating compliance with specified performance rating reference standard.

**1.04 QUALITY ASSURANCE**

- A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least five years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with at least three years of documented experience.

**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. Comply with manufacturer's recommendations. Handle materials to avoid damage.

**1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide manufacturer's standard limited warranty for products.
  - 1. Decking Warranty: Provide manufacturer's standard 30 year warranty for single-family residential applications.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Plastic Decking:
  - 1. Azek Building Products, Inc. B.O.D.; TimberTech AZEK Harvest Collection: [www.azek.com/#sle](http://www.azek.com/#sle).
  - 2. CertainTeed, Inc; \_\_\_\_: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - 3. VEKA, Inc; \_\_\_\_: [www.vekainc.com/#sle](http://www.vekainc.com/#sle).

**2.02 PLASTIC DECKING**

- A. Plastic Decking: Capped cellular PVC plastic molded into shapes in standard deck board sizes and profiles; complying with ASTM D7032.

1. Texture: Molded, wood grain.
2. Color: To be selected by Architect from manufacturer's full range.
3. Edges, Field Boards: Square.

**2.03 ACCESSORIES**

- A. Fasteners and Anchors:
  1. Fasteners: Stainless steel, trim head.
  2. Screws: Bugle head, hardened steel, power driven type, length three times thickness of decking. Use concealed fastener system.
- B. Adhesive: Manufacturer's recommended; waterproof, air cure type, cartridge dispensed.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that support framing is ready to receive decking.
- B. Standard Installation: Confirm joists are spaced at 12 inches (305 mm) on center maximum.

**3.02 PREPARATION**

- A. Coordinate placement of bearing items.

**3.03 INSTALLATION**

- A. General: Install products in accordance with manufacturer's published installation instructions.
- B. Install decking with ends staggered over firm bearing.
- C.
- D. Secure with manufacturer's proprietary fastener system.

**3.04 CLEANING**

- A. See Section 01 74 19 - Construction Waste Management and Disposal, for additional requirements.

**3.05 PROTECTION**

- A. Protect installed work from subsequent construction operations. Repair damaged surfaces. Remove and replace work which cannot be repaired.

**END OF SECTION**

**SECTION 06 65 10  
SOLID SURFACE FABRICATIONS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Countertops in all rooms.
- B. Window sills.
- C. Back splashes and side splashes at all solid surface countertop locations.

**1.02 REFERENCE STANDARDS**

- A. ASTM E 84-10b - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. ASTM D 256-10 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
- C. ASTM D 638-10 - Standard Test Method for Tensile Properties of Plastics.
- D. ASTM D 696-08 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C With a Vitreous Silica Dilatometer.
- E. ASTM D 2583-07 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
- F. ASTM D 790-10 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- G. ASTM D 648-07 - Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
- H. ASTM D 792-08 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
- I. ASTM D 2565-99(2008) - Standard Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications.
- J. ASTM G 21-09 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
- K. ANSI Z 124.3-2005 - American National Standard for Plastic Lavatories.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each type of product indicated.
- C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large scale details, attachment devices and other components.
  - 1. Includes full size details, edge details, thermoforming requirements, attachments, etc.
  - 2. Show locations and sizes of furring, blocking, including concealed blocking and reinforcing specified in other sections.
  - 3. Show locations and sizes of cutouts and holes for all items installed in solid surface.
- D. Samples: Submit minimum 6 inch by 6 inch sample in specified color and gloss.
  - 1. Cut sample and seam together for representation of inconspicuous seam.
  - 2. Indicate full range of color and pattern variation.
- E. Product Data: Indicate product description, fabrication information and compliance with specified performance requirements.
- F. Maintenance Data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
- G. Installer's Qualification Statement.
- H. Manufacturer's Qualification Statement.
- I. Evaluation Service Reports: Show compliance with specified requirements.

- J. See Section 01 70 00 - Execution and Closeout Requirements.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this project, with not less than three years of documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of documented experience.

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

- A. Do not deliver components to site until areas are ready for installation.
- B. Store components indoors per manufacturer's instructions prior to installation.
- C. Handle materials so as to prevent damage. Provide protective coverings to prevent damage or staining following installation for the duration of the project.

#### **1.06 FIELD CONDITIONS**

- A. During and after installation maintain temperature and humidity conditions in building spaces at the same levels planned for occupancy.
1. Maintain relative humidity planned for the building and an ambient temperature between 65 and 75 degrees fahrenheit for a minimum of 48 hours prior to installation.

#### **1.07 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Final Acceptance.
- C. Provide ten year manufacturer warranty from Date of Final Acceptance.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Corian: [www.dupont.com](http://www.dupont.com).
- B. LG Hausys America: [www.lghausys.com](http://www.lghausys.com).
- C. Wilsonart: [www.wilsonart.com](http://www.wilsonart.com)
1. Basis of Design or approved substitution.
- D. Hudson: [www.hudsonsolidsurfaces.com](http://www.hudsonsolidsurfaces.com)
- E. Staron: [www.staron.com](http://www.staron.com)
- F. Substitutions: See Section 01 60 00-Product Requirements.

#### **2.02 MATERIALS**

- A. Solid surface components
1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.
2. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.
- B. Thickness: 1/2 inch
- C. Edge treatment: See plans for specific locations where more than one edge treatment is specified.
1. Double Eased - 1/8 inch top edge and 1/8 inch bottom edge.
- D. Backsplash: Applied.
- E. Color: As selected by Architect from manufacturer's price group 1 through 6.
1. Allow for four colors as selected by Architect from manufacturer's full range for solid surface.
- a. Basis of Design: Kimberlite 9215CE

- b. To be verified with owner / architect before ordering.

### 2.03 ACCESSORIES

- A. Joint adhesive: Manufacturer's standard one-or two-part adhesive kit to create inconspicuous, nonporous joints.
- B. Sealant: Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone - any type), UL-listed silicone sealant in colors matching components.

### 2.04 FABRICATION

- A. Shop assembly
  - 1. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
  - 2. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints and without voids.
    - a. Reinforce with strip of solid polymer material, 2" wide.
  - 3. Provide factory cutouts for plumbing fittings and bath accessories as indicated in the plans and on the shop drawings.
  - 4. Rout and finish component edges with clean, sharp returns.
    - a. Rout cutouts, radii and contours to template.
    - b. Smooth edges.
    - c. Repair or reject defective and inaccurate work.
- B. Finish: Surfaces shall have a uniform finish.
  - 1. Matte: Standard finish for high traffic areas.
  - 2. Satin: Standard finish for darker patterns.
  - 3. Semi-gloss: Higher sheen with greater reflectance for lower traffic areas.
  - 4. Gloss: Maximum sheen and reflectance for light traffic areas or vertical applications.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
  - 1. Provide product in the largest pieces available.
  - 2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
    - a. Exposed joints/seams shall not be allowed.
  - 3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
  - 4. Cut and finish component edges with clean, sharp returns.
  - 5. Anchor securely to base cabinets or other supports.
  - 6. Carefully dress joints smooth, remove surface scratches and clean entire surface.
  - 7. Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.
- B. Backsplashes and sidesplashes:
  - 1. Install using manufacturer's standard color-matched silicone sealant.
    - a. Install in accordance with manufacturer's instructions.

### 3.03 REPAIR

- A. Repair or replace damaged work which cannot be repaired to Architect's satisfaction.

**3.04 CLEANING & PROTECTION**

- A. Keep components clean during installation.
- B. Remove adhesives, sealants and other stains.
- C. Protect surfaces from damage until Date of Final Acceptance. Repair or replace damaged components that cannot be repaired to the architect's satisfaction.

**3.05 PROTECTION**

- A. Protect installed materials from subsequent construction operations.

**END OF SECTION**



**SECTION 07 11 13  
BITUMINOUS DAMPPROOFING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Bituminous dampproofing.

**1.02 REFERENCE STANDARDS**

- A. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal; 1997 (Reapproved 2018).
- B. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing; 2013, with Editorial Revision (2019).
- C. NRCA (WM) - The NRCA Waterproofing Manual; 2021.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide properties of primer, bitumen, and mastics.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

**1.04 FIELD CONDITIONS**

- A. Maintain ambient temperatures above 40 degrees F (5 degrees C) for 24 hours before and during application until dampproofing has cured.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Karnak Corporation: [www.karnakcorp.com/#sle](http://www.karnakcorp.com/#sle).
- B. Mar-Flex Systems, Inc: [www.mar-flex.com/#sle](http://www.mar-flex.com/#sle).
- C. W. R. Meadows, Inc: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
- D. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 BITUMINOUS DAMPPROOFING**

- A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
  - 1. Asphalt-Base Emulsion for Metal Protective Coating: ASTM D1187/D1187M, Type I - Continuous water exposure within few days after drying or Type II - Continuous weather exposure after drying.
  - 2. Emulsified Asphalt for Roofing Protective Coating: ASTM D1227/D1227M, Type II, Class 1 - Mineral colloid emulsifying agents with non-asbestos fibers.
  - 3. VOC Content: Not more than permitted by local, State, and federal regulations.
  - 4. Applied Thickness: 1/8 inch (3 mm), minimum, wet film.
  - 5. Products:
    - a. Karnak Corporation; 220 Fibered Emulsion Dampproofing: [www.karnakcorp.com/#sle](http://www.karnakcorp.com/#sle).
    - b. W. R. Meadows, Inc; Sealmastic Emulsion Type I (spray-grade): [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

- C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

**3.02 PREPARATION**

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

**3.03 APPLICATION**

- A. Foundation Walls: Apply two coats of asphalt dampproofing.
- B. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- C. Prime surfaces in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- D. Apply bitumen per manufacturer's recommendations.
- E. Apply bitumen at a temperature limited by equiviscous temperature (EVT) plus or minus 25 degrees F (14 degrees C); do not exceed finish blowing temperature for four hours.
- F. Seal items watertight with mastic, that project through dampproofing surface.

**END OF SECTION**

**SECTION 07 21 00  
THERMAL INSULATION****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Board insulation and integral vapor retarder at cavity wall construction, perimeter foundation wall, and exterior wall behind brick/precast veneer 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; 2023.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2023.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- 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 Metal Stud Framed Walls, Continuous (CI): Extruded polystyrene (XPS) board.
- C. Insulation in Metal Framed Walls: Batt insulation with no vapor retarder.

**2.02 FOAM BOARD INSULATION MATERIALS**

- A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
  - 1. Application: Slab-on Grade/Foundation Wall locations.
  - 2. Type and Compressive Resistance: Type IV, 25 psi (173 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, 5.0 (0.88), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature.
  - 6. Board Thickness: 3 inch (76 mm).
    - a. Slab edge: 3 inch (76mm).
    - b. CMU (below grade): 2 3/4 inch (70mm) - multiple layer.
  - 7. Type and Water Absorption: Type XII, 0.3 percent by volume, maximum, by total immersion.
- B. Extruded Polystyrene (XPS) Continuous Insulation (CI) Board: Comply with ASTM C578, and manufactured using carbon black technology.
  - 1. Application: Stud/CMU Cavity wall locations.

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: 2 inch (50 mm).
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. Thermal Resistance: R-value (RSI-value) of 19 (3.34) or as noted on plans.
  5. Facing: Unfaced.
- B. Mineral Wool Blanket Thermal Insulation: Flexible or semi-rigid preformed insulation, complying with ASTM C665.
  1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
  2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
  3. Thermal Resistance: R-value (RSI-value) of 19 (3.34) or as noted on plans.

### **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. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.
- C. 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 boards horizontally on foundation perimeter.
  1. Place boards to maximize adhesive contact.
  2. Butt edges and ends tightly to adjacent boards and to protrusions.
- B. 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 roof 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.

**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 21 19  
FOAMED-IN-PLACE INSULATION****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Foamed-in-place insulation.
  - 1. In underside of roofs and ceilings.

**1.02 REFERENCE STANDARDS**

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2021.
- B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2019.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- E. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

**PART 2 PRODUCTS****2.01 MATERIALS**

- A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open cell or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
  - 1. Thermal Resistance: R-value (RSI-value) of 5.0 (0.88), minimum, per 1 inch (25.4 mm) thickness at 75 degrees F (24 degrees C) mean temperature when tested in accordance with ASTM C518.
  - 2. Water Vapor Permeance: Vapor retarder; 2 perms (115 ng/(Pa s sq m)), maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
  - 3. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
  - 4. Air Permeance: 0.04 cfm per square foot (0.2 L/(s/sq m)), maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf (75 Pa).
  - 5. Closed Cell Content: At least 90 percent.
  - 6. Surface Burning Characteristics: Flame spread/smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.

**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.

### 3.03 APPLICATION

- A. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643-10.
- B. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
- C. 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 26  
FLUID-APPLIED MEMBRANE AIR BARRIERS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fluid-applied membrane air barriers.

**1.02 REFERENCE STANDARDS**

- A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-- Tension; 2016 (Reapproved 2021).
- B. ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers; 2000 (Reapproved 2020).
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- E. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.
- F. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies; 2023a.
- G. ASTM G154 - Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials; 2023.
- H. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on material characteristics, performance criteria, and limitations.
- C. Shop Drawings: Provide drawings of special joint conditions.
- D. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to project site in original packaging with seals unbroken and properly labeled.
- B. Store materials in their original undamaged packaging within clean, dry, and protected location at a temperature less than 90 degrees F (32 degrees C).

**1.06 FIELD CONDITIONS**

- A. Maintain temperature and humidity recommended by materials manufacturer before, during, and after installation.
  - 1. Do not apply air barrier products when air or substrate temperatures are above 100 degrees F (38 degrees C) or below 20 degrees F (minus 6 degrees C).

2. Allow wet substrates to dry prior to applying air barrier products.

### 1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Fluid-Applied Membrane Air Barrier:
  1. Dow: [www.dow.com/#sle](http://www.dow.com/#sle).
  2. W.R. Meadows, Inc.: [www.wrmeadows.com](http://www.wrmeadows.com).
  3. Carlisle Coatings & Waterproofing: [www.carlisle.com](http://www.carlisle.com).
  4. Prosoco: [www.prosoco.com](http://www.prosoco.com).
  5. Grace Construction Products: [www.graceconstruction.com](http://www.graceconstruction.com).
  6. TK Products: [www.tkproducts.com](http://www.tkproducts.com).
  7. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 FLUID-APPLIED MEMBRANE AIR BARRIER ASSEMBLY

- A. Fluid-Applied Membrane Air Barrier: Single-component, vapor permeable, 100 percent silicone elastomeric air barrier.
  1. Dry Film Thickness (DFT): 15 mils, 0.015 inch (0.381 mm), minimum.
  2. Air Permeance: 0.004 cfm/sq ft (0.02 L/sec sq m) maximum leakage when tested at 1.57 psf (75 Pa) pressure difference in accordance with ASTM E2178.
  3. Vapor Permeance: 10 perms (574 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M using Desiccant Method at 73.4 degrees F (23 degrees C).
  4. Air Barrier Leakage: Not greater than 0.04 cfm/sq ft (0.2 L/sq m) of surface area at pressure of 1.57 psf (75 Pa) when tested in accordance with ASTM E2357.
  5. Ultraviolet (UV) Exposure: Rated for up to 5,000 hours of exposure in accordance with ASTM G154; not less than 12 months.
  6. Elongation: Greater than 600 percent, when tested in accordance with ASTM D412.
  7. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
  8. Fire Propagation Characteristics: Provide air barrier coatings and accessory materials that are tested for compliance with NFPA 285 when used within exterior wall assembly.
- B. Primer: Water-based silicone adhesion promoter.
- C. Preformed Transition Strips and Molded Corners: Semi-rigid silicone elastomer extrusion, tear resistant, with tapered edges; applied and adhered with sealant.
  1. Elongation: Greater than 400 percent, when tested in accordance with ASTM D412.
  2. Tensile Strength: Greater than 800 psi (5.5 MPa), when tested in accordance with ASTM D412.
  3. Tear Strength: Greater than 200 psi (16 kN/m), when tested in accordance with ASTM D624.

### 2.03 ACCESSORIES

- A. Thinners and Cleaners: As recommended by material manufacturer.
- B. Crack Fillers: Provide substrate manufacturer's recommended crack fillers or sealants compatible with air barrier assembly components and adjacent materials.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept work of this section.
- B. Verify that surfaces are clean, dry, and free of frost, dust, dirt, grease, oil, curing compounds, form release agents, laitance, efflorescence, mildew, excess alkalinity, and other conditions affecting performance of this work.

### 3.02 PREPARATION

- A. Protect work of other trades against damage from application of air barrier coatings.

- B. Protect adjacent surfaces not designated to receive air barrier coatings; provide protection for pedestrians, vehicles, landscaping, and surrounding areas to prevent contact with coating materials.
- C. Clean substrates to remove contaminants and foreign material by pressure cleaning, wire brushing, grinding or other method recommended by air barrier coatings manufacturer.
- D. Prepare substrates in accordance with air barrier coating manufacturer's written instructions.
- E. Repair deteriorated or damaged substrates, repair masonry joints, and fill cracks, voids, honeycombs, and other defects using materials as recommended by air barrier coating manufacturer, and allow patching materials to fully cure.
  - 1. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
  - 2. Fill cracks larger than 1/16 inch (1.6 mm) wide using applicable joint sealant, and fill cracks larger than 1 inch (25.4 mm) wide using joint sealant and compatible bond breaker where movement is expected.
- F. Primer: Apply primer to substrates where required based upon preinstallation testing and air barrier coating manufacturer's recommendations, using application methods and rate of application recommended by manufacturer; allow primer to fully dry prior to application of air barrier coating.

### 3.03 APPLICATION

- A. Apply air barrier system materials in accordance with manufacturer's instructions.
- B. Transition Strips and Silicone Sealants: Install with approved sealants in accordance with manufacturer's written instructions.
  - 1. Form sealed joints to windows, wall framing systems, door and louver frames, roofing system perimeters, and at interface with other adjacent materials utilizing compatible components that form air barrier assembly.
- C. Air Barrier Coating: Apply air barrier coating using application methods and rate of application recommended by manufacturer, using nap roller or airless sprayer, in accordance with requirements of authorities having jurisdiction (AHJ).
  - 1. Provide wet application not less than 30 mils, 0.030 inch (0.76 mm) thick, or more as required by substrate conditions, with dry film thickness (DFT) not less than 15 mils, 0.015 inch (0.38 mm) thick.

### 3.04 CLEANING

- A. During completion of this work, remove overspray and excess material, using materials and methods approved by manufacturer that will not damage adjacent materials.
- B. Clean and repair adjacent surfaces damaged by air barrier coating application.

### 3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.
- B. Allow air barrier coatings to fully cure before exposure to traffic or other construction operations.

**END OF SECTION**

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**SECTION 07 31 13  
ASPHALT SHINGLES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Asphalt shingle roofing.
- B. Flexible sheet membranes for eave protection, underlayment, and valley protection.
- C. Flashing.

**1.02 REFERENCE STANDARDS**

- A. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules; 2023.
- B. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2020a.
- 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 data indicating material characteristics, performance criteria, limitations, and \_\_\_\_\_.
- C. Shop Drawings: For metal flashings, indicate specially configured metal flashings, jointing methods and locations, fastening methods and locations, installation details, and \_\_\_\_\_.
- 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. Manufacturer's qualification statement.
- H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- I. 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: Company specializing in manufacture of roofing systems similar to those required for this project, with not less than 5 years of documented experience.

**1.05 MOCK-UPS**

- A. See Section 01 40 00 - Quality Requirements for additional requirements.
- B. Provide mock-up of \_\_\_ sq ft (\_\_\_ sq m), including underlayment, shingles, eave protection membrane, associated flashings, and \_\_\_\_\_.
- C. Locate as directed by Architect.
- D. Mock-up may remain as part of work.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store materials with labels intact in manufacturer's unopened packaging until ready for installation.
- B. When storing roofing materials on roofing system ensure that no damage occurs to supporting members and other materials.

**1.07 FIELD CONDITIONS**

- A. Do not install shingles, eave protection membrane, underlayment, or \_\_\_\_\_ when surface, ambient air, wind chill, or \_\_\_\_\_ temperatures are below 45 degrees F (7 degrees C).

**1.08 WARRANTY**

- A. Provide lifetime manufacturer's warranty for coverage against black streaks caused by algae.
- B. Provide 5-year manufacturer's warranty for wind damage.
- C. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Asphalt Shingles:
  - 1. Atlas Roofing Corporation; \_\_\_\_\_: [www.atlasroofing.com/#sle](http://www.atlasroofing.com/#sle).
  - 2. Certaineed Roofing; Landmark Premium Shingles: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - 3. GAF; Timberline HDZ RS Shingles: [www.gaf.com/#sle](http://www.gaf.com/#sle).
  - 4. IKO Industries Inc; \_\_\_\_\_: [www.iko.com/#sle](http://www.iko.com/#sle).

**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. Fire or Wind Resistance Criteria: Provide UL (DIR) listed and labeled products.
  - 3. Style: Square.
  - 4. Color: As selected by Architect.

**END OF SECTION**



**SECTION 07 41 13  
METAL ROOF PANELS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Metal roof panel system of preformed steel panels.

**1.02 REFERENCE STANDARDS**

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2022.
- D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2023.
- E. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2017).
- F. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2018.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Storage and handling requirements and recommendations.
  - 2. Installation methods.
  - 3. Specimen warranty.
- C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
  - 1. Show work to be field-fabricated or field-assembled.
- D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches (305 mm) square, representing actual roofing metal, thickness, profile, color, and texture.
  - 1. Include typical panel joint in sample.
  - 2. Include typical fastening detail.
- F. Test Reports: Indicate compliance of metal roofing system to specified requirements.
- G. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section and with at least three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. See Section 01 74 19 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

- C. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

### 1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Panel Material: Furnish manufacturers 25 year warranty covering the panel against rupture, structural failure, or perforation.
- C. Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of thirty years from Date of Substantial Completion.
- D. Waterproofing Warranty: Provide manufacturer's warranty for weathertightness of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of twenty years from Date of Substantial Completion.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Architectural Metal Roof Panel Manufacturers:
  - 1. McElroy Metal: [www.mcelroymetal.com/#sle](http://www.mcelroymetal.com/#sle).
    - a. Maxima Basis of Design or approved substitution.
  - 2. ATAS International, Inc: [www.atas.com/#sle](http://www.atas.com/#sle).
  - 3. Berridge Manufacturing Company: [www.berridge.com/#sle](http://www.berridge.com/#sle).
  - 4. Petersen Aluminum Corporation: [www.pac-clad.com/#sle](http://www.pac-clad.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 PERFORMANCE REQUIREMENTS

- A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
  - 1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed  $L/180$  of span length(L) when tested in accordance with ASTM E1592.
    - a. Dead Loads: Weight of roofing system.
    - b. Live Loads: As required by ASCE 7.
  - 2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
  - 3. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F (56 degrees C).

### 2.03 METAL ROOF PANELS

- A. Metal Roof Panels: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Metal Panels: Factory-formed panels with factory-applied finish.
  - 1. Steel Panels:
    - a. Aluminum-zinc alloy-coated steel complying with ASTM A792/A792M; minimum AZ50 (AZM150) coating.
    - b. Steel Thickness: Minimum 24 gauge, 0.024 inch (0.61 mm).
  - 2. Profile: Standing seam, with minimum 2.0 inch (51 mm) seam height; concealed fastener system for field seaming with special tool.
  - 3. Texture: Smooth.
  - 4. Length: Full length of roof slope, without lapped horizontal joints.
  - 5. Width: Maximum panel coverage of 16 inches (406 mm).

**2.04 ATTACHMENT SYSTEM**

- A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

**2.05 FABRICATION**

- A. Panels: Provide factory fabricated panels and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
- B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

**2.06 FINISHES**

- A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch (0.023 mm); color and gloss as selected by Architect from manufacturer's standard line.

**2.07 ACCESSORIES**

- A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, trim, moldings, closure strips, and caps of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.
- C. Sealants:
  - 1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
  - 2. Concealed Sealant: Non-curing butyl sealant or tape sealant.
  - 3. Seam Sealant: Factory-applied, non-skinning, non-drying type.
- D. Underlayment: Self-adhering polymer modified sheet; 20 mil (0.51 mm) total thickness; with strippable siliconized release film on bottom side and slip resistant and UV-stable facing on top side.
  - 1. Water Vapor Permeance: 30 perm (1716 ng/(Pa s sq m)), maximum, when tested in accordance with ASTM E96/E96M, Desiccant Method A.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

**3.02 PREPARATION**

- A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to ensure that completed roof will be free of leaks.
- B. Remove protective film from surface of roof panels immediately prior to installation; strip film carefully to avoid damage to prefinished surfaces.
- C. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by metal roof panel manufacturer.
- D. At locations where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

**3.03 INSTALLATION**

- A. Overall: Install roofing system in accordance with approved shop drawings and metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions;

securely anchor components of roofing system in place allowing for thermal and structural movement.

1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
  2. Minimize field cutting of panels. Where field cutting is required, use methods that will not distort panel profiles. Use of torches for field cutting is prohibited.
- B. Accessories: Install necessary components that are required for complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.
- C. Roof Panels: Install metal roof panels in accordance with manufacturer's installation instructions, minimizing transverse joints except at junction with penetrations.

#### **3.04 CLEANING**

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

#### **3.05 PROTECTION**

- A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

**END OF SECTION**

**SECTION 07 46 46  
FIBER-CEMENT SIDING****PART 1 GENERAL****1.01 RELATED REQUIREMENTS**

- A. Section 05 40 00 - Cold-Formed Metal Framing: Water-resistive barrier under siding.

**1.02 REFERENCE STANDARDS**

- A. ASTM C1186 - Standard Specification for Flat Fiber-Cement Sheets; 2022, with Editorial Revision (2023).

**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. Manufacturer's qualification statement.
- E. Installer's qualification statement.
- F. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

**1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of type specified in this section with not less than three years of experience.

**1.05 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.

**1.06 FIELD CONDITIONS**

- A. Do not install panels when air temperature or relative humidity are outside manufacturer's limits.

**1.07 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

**PART 2 PRODUCTS****2.01 FIBER-CEMENT 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: V-Groove.
  - 2. Texture: Smooth.
  - 3. Length: 12 feet (3.7 m), nominal min.
  - 4. Width (Height): 8-1/4 inches (210 mm).
  - 5. Thickness: 5/8 inch (\_\_\_\_ mm), nominal.
  - 6. Finish: Factory applied primer.

7. Color: As selected by Architect from manufacturers full range of available colors.
8. Warranty: 50 year limited; transferable.
9. Products:
  - a. Allura, a division of Plycem USA, Inc; \_\_\_\_\_: [www.allurausa.com/#sle](http://www.allurausa.com/#sle).
  - b. James Hardie Building Products, Inc; B.O.D.: Artisan V Groove: [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.

## 2.02 ACCESSORIES

- A. Trim: Same material and texture as siding.
- B. Fasteners: Galvanized or corrosion resistant; length as required to penetrate, 1-1/4 inches (31.8 mm), minimum.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine substrate, clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Verify that water-resistant barrier has been installed over substrate completely and correctly; see Section 05 40 00.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.02 PREPARATION

- A. Protect surrounding areas and adjacent surfaces during execution of this work.
- B. Install Sheet Metal Flashing:

### 3.03 INSTALLATION

- A. Install siding 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. Joints in Horizontal Siding: Avoid joints in lap siding except at corners; where joints are inevitable stagger joints between successive courses.
- C. 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.
- D. After installation, seal joints except lap joints of lap siding; seal around penetrations, and paint exposed cut edges.

### 3.04 CLEANING

- A. See Section 01 70 00 - Execution and Closeout Requirements for additional requirements.
- B. Clean faced panels in accordance with manufacturer's maintenance instructions, using cleaning materials and methods acceptable to manufacturer.

### 3.05 PROTECTION

- A. Protect installed products until Date of Substantial Completion.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

## END OF SECTION

**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. 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 A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 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); 0.050 inch (1.0 mm) thick; plain finish shop pre-coated with fluoropolymer coating.
  - 1. Color: As selected by Architect from manufacturer's full range of colors.
- C. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gauge, 0.0156 inch (0.40 mm) thick; smooth No. 4 - Brushed finish.

**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. Above projections.
  - 6. At other discontinuities in the cavity.

**1.02 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

**1.03 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.

**1.04 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.

**1.05 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.

**1.06 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.

**1.07 PROJECT CONDITIONS**

- A. Applicator shall have full, safe access to area.
- B. Apply Product and Accessories within temperature ranges indicated in Manufacturer's literature.

**1.08 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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Division 07

New Facility For  
North Granville County Senior Center

**SECTION 07 71 23  
MANUFACTURED GUTTERS AND DOWNSPOUTS**

**PART 1 GENERAL  
PART 2 PRODUCTS  
2.01 MATERIALS**

**END OF SECTION**

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**SECTION 07 72 00  
ROOF ACCESSORIES****PART 1 GENERAL****1.01 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 A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2022.

**1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
  - 4. Maintenance requirements.
- C. Shop Drawings: Submit detailed layout developed for this project, with design calculations for loadings and spacings.
  - 1. Show profiles, accessories, location, and dimensions.
- D. Warranty Documentation:
  - 1. Submit manufacturer warranty.
  - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.
  - 3. Submit documentation that roof accessories are acceptable to roofing manufacturer, and do not limit the roofing warranty.

**1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

**1.04 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Final Acceptance.

**PART 2 PRODUCTS****2.01 SNOW GUARDS**

- A. Fence Type Snow Guard: Continuous snow guard; manufacturer's standard pipe, bar, channel, or solid rod, set in brackets or posts, with optional plates and metal trim to match roof.
  - 1. Brackets: Aluminum.
  - 2. Pipe or Square Tube: Aluminum.
    - a. Outside Diameter, Round: 1 inch (25.4 mm), nominal.
    - b. Outside Dimensions, Square: 1 inch (25.4 mm), nominal.
    - c. Threaded Couplings: Match pipe or tube, manufacturers standard.
    - d. Sleeve Couplings: Manufacturer's standard material.
    - e. End Collars and Caps: Metal to match tube.
  - 3. Finish: All components - powder coat to match roof.
  - 4. Solid Rod: Aluminum, mill finish.
    - a. Outside Diameter: 3/8 inch (9.5 mm).
    - b. Threaded Couplings: Aluminum, mill finish, manufacturers standard.
    - c. End Collars and Caps: Manufacturer's standard material.
  - 5. Extruded Aluminum Channel: Manufacturer's standard shape; with slot for insertion of metal trim matching roof.

6. Supplemental Plates and Clips: Attached to horizontal component; match finish of pipe, tube, rod, or channel.
  7. Snow Clips: SnoClip, center between every seam.
- B. Clamps for Standing Seam Roof: Aluminum clamps attached to standing seams of roof panels; for attachment of fence type snow guard.
1. Seam Profile: Selected by Architect from manufacturer's standard range; match profile of metal roof.
  2. Finish: Mill finish.
- C. Products:
1. Alpine Snow Guards: [www.alpinesnowguards.com](http://www.alpinesnowguards.com).
  2. Berger Building Products: [www.bergerbp.com/#sle](http://www.bergerbp.com/#sle).
  3. Rocky Mountain Snow Guards, Inc: [www.rockymountainsnowguards.com/#sle](http://www.rockymountainsnowguards.com/#sle).
  4. Substitutions: See Section 01 60 00 - Product Requirements.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. 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 methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

#### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

#### **3.04 CLEANING**

- A. Clean installed work to like-new condition.

**END OF SECTION**



**SECTION 07 84 00  
FIRESTOPPING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Firestopping systems.
- B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not.

**1.02 REFERENCE STANDARDS**

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2023a.
- C. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2023.
- D. ITS (DIR) - Directory of Listed Products; Current Edition.
- E. FM 4991 - Approval Standard of Firestop Contractors; 2013.
- F. FM (AG) - FM Approval Guide; Current Edition.
- G. UL 1479 - Standard for Fire Tests of Penetration Firestops; Current Edition, Including All Revisions.
- H. UL (FRD) - Fire Resistance Directory; Current Edition.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.
- C. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.

**1.04 QUALITY ASSURANCE**

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
  - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
  - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at [www.icc-es.org](http://www.icc-es.org) will be considered as constituting an acceptable test report.
  - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
  - 1. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
  - 2. Verification of minimum three years documented experience installing work of this type.
  - 3. Verification of at least five satisfactorily completed projects of comparable size and type.
  - 4. Licensed by local authorities having jurisdiction (AHJ).

**1.05 FIELD CONDITIONS**

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

**PART 2 PRODUCTS****2.01 MATERIALS**

- A. Firestopping Materials: Any materials meeting requirements.
- B. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

**2.02 FIRESTOPPING ASSEMBLY REQUIREMENTS**

- A. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
- B. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.

**2.03 FIRESTOPPING FOR FLOOR-TO-FLOOR, FLOOR-TO-WALL, HEAD-OF-WALL, AND WALL-TO-WALL JOINTS**

- A. Gypsum Board Walls:
  - 1. Wall-to-Wall Joints That Have Movement Capabilities (Dynamic-D):
    - a. 1 Hour Construction: UL System WW-D-0067; Hilti CP 606 Flexible Firestop Sealant.
  - 2. Head-of-Wall Joints at Concrete Over Metal Deck, Wall Parallel to Ribs:
    - a. 1 Hour Construction: UL System HW-D-0049; Hilti CFS-SP WB Firestop Joint Spray and CP 672.
  - 3. Head-of-Wall Joints at Concrete Over Metal Deck, Wall Perpendicular to Ribs, Cut to Fit Ribs:
    - a. 1 Hour Construction: UL System HW-D-0045; Hilti CP 606 Flexible Firestop Sealant.
  - 4. Head-of-Wall Joints at Concrete Over Metal Deck, Wall Perpendicular to Ribs, Not Cut to Fit:
    - a. 1 Hour Construction: UL System HW-D-0045; Hilti CP 606 Flexible Firestop Sealant.

**2.04 FIRESTOPPING SYSTEMS**

- A. Firestopping: Any material meeting requirements.
  - 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.
  - 2. Fire Ratings: See drawings for required systems and ratings.
- B. Firestopping at Uninsulated Metallic Pipe and Conduit Penetrations, of diameter 4 inches (100 mm) or less: Any material meeting requirements.
- C. Firestopping at Combustible Pipe and Conduit Penetrations, of diameter 4 inches (100 mm) or less: Any material meeting requirements.
- D. Firestopping at Cable Tray Penetrations: Any material meeting requirements.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify openings are ready to receive the work of this section.

**3.02 PREPARATION**

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.

**3.03 INSTALLATION**

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.

**3.04 CLEANING**

- A. Clean adjacent surfaces of firestopping materials.

**3.05 PROTECTION**

- A. Protect adjacent surfaces from damage by material installation.

**END OF SECTION**

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**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 (Reapproved 2023).
- 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 (Reapproved 2023).
- 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; 2023.

**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.

**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.

**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. 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.
2. Do Not Seal:
  - a. Intentional weep holes in masonry.
  - b. Joints indicated to be covered with expansion joint cover assemblies.
  - c. Joints where sealant is specified to be furnished and installed by manufacturer of product to be sealed.
  - d. Joints where sealant installation is specified in other sections.
  - e. Joints between suspended ceilings 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. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
  4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
  5. 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. Movement Capability: Plus and minus 25 percent, minimum.
  2. 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. Movement Capability: Plus and minus 25 percent, minimum.
  2. Color: Gray.

## 2.06 ACCESSORIES

- A. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- B. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- C. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- D. 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. Fire-rated hollow metal doors and frames.
- D. Thermally insulated hollow metal doors with frames.
- E. Hollow metal borrowed lites glazing frames.
- F. Accessories, including glazing, louvers, and matching panels.

**1.02 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames; 2019.
- C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.
- D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.
- E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.
- G. 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.
- H. 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.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- J. BHMA A156.115 - Hardware Preparation in Steel Doors and 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 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
- Q. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2023.
- R. 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.
- G. Manufacturer's Qualification Statement.
- H. Installer's Qualification Statement.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- 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. Hollow Metal Doors and Frames:
  - 1. Ceco Door, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  - 2. Fleming Door Products, an Assa Abloy Group company: [www.assaabloydss.com/#sle](http://www.assaabloydss.com/#sle).
  - 3. Mesker, dormakaba Group: [www.meskeropeningsgroup.com/#sle](http://www.meskeropeningsgroup.com/#sle).
  - 4. Republic Doors, an Allegion brand: [www.republicdoor.com/#sle](http://www.republicdoor.com/#sle).
  - 5. De La Fontaine Inc: [www.delafontaine.com](http://www.delafontaine.com).
  - 6. Steelcraft, an Allegion brand: [www.allegion.com/#sle](http://www.allegion.com/#sle).
  - 7. 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. 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.
- 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. Exterior Doors: Thermally insulated.
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 - Extra Heavy Duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
  2. Door Core Material: Polystyrene, 1 lbs/cu ft minimum density.
    - a. Foam Plastic Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
  3. Door Thermal Resistance: R-Value of 6.0 minimum, for installed thickness of polystyrene.
  4. Door Thickness: 1-3/4 inches (44.5 mm), nominal.
  5. Door Face Sheets: Flush.
  6. Weatherstripping: Refer to Section 08 71 00.
  7. Door Finish: Factory primed and field finished.
- B. Interior Doors, Non-Fire Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 3 - Extra Heavy-duty.
    - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 20 gauge, 0.032 inch (0.8 mm), minimum.
  2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
  3. Door Face Sheets: Flush.
  4. Door Finish: Factory primed and field finished.

### 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 gage, 0.053 inch (1.3 mm), minimum.
  2. Frame Finish: Factory primed and field finished.
- D. Interior Door/Window Frames, Fire-Rated: Full profile/continuously welded type.
1. Fire Rating: Same as door/window, labeled.
  2. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
  3. Frame Finish: Factory primed and field finished.
- E. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- F. Mullions for Pairs of Doors: Removable type, with profile similar to jambs.

- G. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- H. Frames Wider than 48 inches (1219 mm): Reinforce with steel channel fitted tightly into frame head, flush with top.

## **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. Astragals for Double Doors: Specified in Section 08 7100.
- D. 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.
- E. 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. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Install door hardware as specified in Section 08 71 00.
- E. Comply with glazing installation requirements of Section 08 80 00.
- F. Coordinate installation of electrical connections to electrical hardware items.
- G. 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**

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**SECTION 08 14 16  
FLUSH WOOD DOORS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Flush wood doors; flush and flush glazed configuration; fire-rated and non-rated.

**1.02 REFERENCE STANDARDS**

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.
- C. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.
- D. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- E. WDMA I.S. 1A - Interior Architectural Wood Flush Doors; 2021, with Errata (2022).

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
  - 1. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
- D. Samples: Submit two samples of door construction, 12 by 12 inch ( 300 by 300 mm) in size cut from top corner of door.
- E. Samples: Submit two samples of door veneer, 12 by 12 inch (300 by 300 mm) in size illustrating wood grain, stain color, and sheen.
- F. Manufacturer's Installation Instructions: Indicate special installation instructions.
- G. Manufacturer's qualification statement.
- H. Installer's qualification statement.
- I. Specimen warranty.
- J. Warranty, executed in Owner's name.

**1.04 QUALITY ASSURANCE**

- A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.
  - 1. Work shall be in accordance with the Grade or the Grades Specified of the Architectural Woodwork Standards.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of documented experience.
  - 1. Company with at least one project within past five years with value of woodwork within at least 20 percent of cost of woodwork for this project.
- C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.
- D. Single Source Responsibility: A single manufacturer shall provide and install the work of this Section.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.

- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.
- D. Deliver materials only when the project is ready for installation and the general contractor has provided a clean storage area.
- E. Maintain indoor temperature and humidity within the range recommended by the Architectural Woodwork Standards for the location of the project.
- F. Coordinate fabrication, delivery, and installation with the general contractor and other applicable trades.

### 1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Wood Veneer Faced Doors:
  - 1. Haley Brothers: [www.haleybros.com/#sle](http://www.haleybros.com/#sle).
  - 2. Marshfield DoorSystems, Inc: [www.marshfielddoors.com/#sle](http://www.marshfielddoors.com/#sle).
  - 3. VT Industries, Inc: [www.vtindustries.com/#sle](http://www.vtindustries.com/#sle).
  - 4. Chappell Door Company: [www.chappelldoor.net](http://www.chappelldoor.net).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 DOORS

- A. All Interior Doors: See drawings for locations and additional requirements.
  - 1. Quality Standard: Premium Grade, Heavy Duty performance, in accordance with WDMA I.S. 1A.
  - 2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches (44 mm) thick unless otherwise indicated; flush construction.
  - 1. Provide solid core doors at each location.
  - 2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
  - 3. Wood veneer facing with factory transparent finish.

### 2.03 DOOR AND PANEL CORES

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
- B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

### 2.04 DOOR FACINGS

- A. Veneer Facing for Transparent Finish: Select White Maple, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.
  - 1. Vertical Edges: Same species as face veneer.
  - 2. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet (3 m) of each other when doors are closed.

### 2.05 DOOR CONSTRUCTION

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
  - 1. Provide solid blocks at lock edge and top of door for closer for hardware reinforcement.
  - 2. Provide solid blocking for other throughbolted hardware.



- C. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.
- D. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- E. Interior glazed opening doors shall be true one-piece lumber.
- F. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- G. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- H. Provide edge clearances in accordance with the quality standard specified.

## **2.06 FINISHES - WOOD VENEER DOORS**

- A. Finish work in accordance with WDMA I.S. 1A for grade specified and as follows:
  - 1. Transparent:
    - a. Manufacturers standard, in compliance with performance duty level indicated.
    - b. Sheen: As selected by Architect from manufacturer's full range.
- B. Factory finish doors in accordance with approved sample.
- C. Seal door top edge with color sealer to match door facing.

## **2.07 ACCESSORIES**

- A. Door Window Frames: Door window frames with glazing securely fastened within door opening.
  - 1. Size: As indicated on drawings.
- B. Glazing: See Section 08 80 00.
- C. Glazing Stops: Wood, of same species as door facing, mitered corners; prepared for countersink style tamper proof screws.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

### **3.02 INSTALLATION**

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
  - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.

### **3.03 TOLERANCES**

- A. Comply with specified quality standard for fit and clearance tolerances.
  - 1. Door fit in rated assemblies shall be in strict compliance with fire rating limitations.
  - 2. No door shall be undercut more than 3/4 inch (19 mm).
  - 3. Undercut clearances:
    - a. From top of decorative floor covering: 1/2 inch (12.7 mm).
    - b. From top of non-combustible floor: 3/4 inch (19 mm) maximum.
    - c. From top of non-combustible sill or threshold: 3/8 inch (9.5 mm) maximum.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

**3.04 ADJUSTING**

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

**END OF SECTION**

**SECTION 08 33 13  
COILING COUNTER DOORS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Non-fire-rated coiling counter doors and operating hardware.

**1.02 REFERENCE STANDARDS**

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

**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.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Coiling Counter Doors:
  - 1. Alpine Overhead Doors, Inc; Counter Shutter - Rolling Shutters: [www.alpinedoors.com/#sle](http://www.alpinedoors.com/#sle).
  - 2. C.H.I. Overhead Doors; Model 6522 (steel): [www.chiohd.com/#sle](http://www.chiohd.com/#sle).
  - 3. Overhead Door Corporation; Counter Door - Model 650: [www.overheaddoor.com/#sle](http://www.overheaddoor.com/#sle).
  - 4. Wayne-Dalton, a Division of Overhead Door Corporation; Security Shutter - Model 523: [www.wayne-dalton.com/#sle](http://www.wayne-dalton.com/#sle).

**2.02 COILING COUNTER DOORS**

- A. Coiling Counter Metal Doors, Non-Fire-Rated: Aluminum slat curtain.
  - 1. Mounting: Interior face mounted.
  - 2. Nominal Slat Size: 1-1/4 inches (32 mm) wide.
  - 3. Slat Profile: Flat, perforated.
  - 4. Finish, Aluminum: Anodized.
  - 5. Guides: Formed track; same material and finish unless otherwise indicated.

**2.03 COMPONENTS**

- A. Metal Curtain Construction: Interlocking, single-thickness slats.
  - 1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
  - 2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
  - 3. Aluminum Slats: ASTM B221 (ASTM B221M), aluminum alloy Type 6063; minimum thickness 0.05 inch (1.3 mm).
- B. Guide Construction: Continuous, of profile to retain door in place, with mounting brackets of same metal.
  - 1. Aluminum Guides: Extruded aluminum channel, with wool pile runners along inside.
- C. Lock Hardware:
- D. Roller Shaft Counterbalance: Steel pipe and torsion steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb (10 kg) nominal force to operate.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Install units in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

**3.02 TOLERANCES**

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch (1.5 mm).
- C. Maximum Variation From Level: 1/16 inch (1.5 mm).
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft (3 mm per 3 m) straight edge.

**3.03 ADJUSTING**

- A. Adjust operating assemblies for smooth and noiseless operation.

**3.04 CLEANING**

- A. Clean installed components.
- B. Remove labels and visible markings.

**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. Infill panels of spandrel glass.
- C. Aluminum doors.
- D. 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. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.
- E. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.
- F. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.
- G. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- H. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.
- I. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.
- J. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.
- K. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2019.
- L. 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).
- M. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); 2002 (Ed. 2004).

**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.
- C. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- D. Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

### **1.07 FIELD CONDITIONS**

- A. 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 Substantial Completion.
- 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 Manufacturers:
  - 1. Coral Architectural Products, a division of Coral Industries, Inc: [www.coralap.com/#sle](http://www.coralap.com/#sle).
  - 2. Kawneer North America: [www.kawneer.com/#sle](http://www.kawneer.com/#sle).
    - a. Product - Exterior Storefront - Typical: Trifab VG 601T, Basis of Design or approved substitution.
    - b. Product - Interior Sotrefront: Trifab VG 450, Basis of Design or approved substitution.

- c. Product - Doors: 350 Medium Stile, Basis of Design or approved substitution.
- 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. Trulite Glass & Aluminum Solutions, LLC: [www.trulite.com/#sle](http://www.trulite.com/#sle).
- 6. YKK AP America, Inc: [www.ykkap.com/commercial/#sle](http://www.ykkap.com/commercial/#sle).
- 7. EFCO Corporation: [www.efcocorp.com](http://www.efcocorp.com).
- 8. 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 - Exterior Applications: For 1 inch (25 mm) insulating glazing.
  - 2. Glazing Rabbet - Interior Applications: For 1/4 inch (6 mm) monolithic glazing.
  - 3. Glazing Position - Exterior Applications: Front-set.
  - 4. Glazing Position - Interior Applications: Centered (front to back).
  - 5. Finish - Exterior Applications: Class I natural anodized.
  - 6. Finish - Interior Applications: Class II natural anodized.
    - a. Factory finish all surfaces that will be exposed in completed assemblies.
    - b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
  - 7. Finish Color - Exterior Applications: Clear.
  - 8. Finish Color - Interior Applications: Clear.
  - 9. 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.
  - 10. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
  - 11. 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.
  - 12. 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.
  - 13. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
  - 14. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
  - 15. Maintain continuous air barrier and/or vapor retarder seal throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel, and heel bead of glazing compound.
  - 16. Preparation for Window Treatments: Provide reinforced interior horizontal head rail.
- 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.
      - 1) Basic Wind Speed (MPH): 120 mph.
      - 2) Importance Factor: 1.0.
      - 3) Exposure Category: C.
    - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
  - 2. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf (75 Pa) pressure difference.
  - 3. Air Leakage: 0.06 cfm/sq ft (0.3 L/sec sq m) maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf (75 Pa) pressure difference.

**C. Components**

1. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
  - a. Framing members for interior applications need not be thermally broken.
  - b. Glazing Stops: Flush.
  - c. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.
2. Glazing: See Section 08 80 00.
3. Swing Doors: Glazed aluminum.
  - a. Thickness: 1-3/4 inches (43 mm).
  - b. Bottom Rail: 10 inches (254 mm) wide.
  - c. Glazing Stops: Beveled.
  - d. Finish: Same as storefront.

**D. Materials**

1. Extruded Aluminum: ASTM B221 (ASTM B221M).
2. Sheet Aluminum: ASTM B209/B209M.
3. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.
4. Structural Steel Sections: ASTM A36/A36M; shop primed.
5. Fasteners: Stainless steel.
6. Exposed Flashings: Aluminum sheet, 20 gauge, 0.032 inch (0.81 mm) minimum thickness; finish to match framing members.
7. Concealed Flashings: Galvanized steel, 26 gauge, 0.0179 inch (0.45 mm) minimum base metal thickness.
8. Sealant for Setting Thresholds: Non-curing butyl type.
9. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
10. Glazing Accessories: See Section 08 80 00.
11. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

**E. Finishes**

1. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.
2. Class II Natural Anodized Finish: AAMA 611 AA-M12C22A31 Clear anodic coating not less than 0.4 mils (0.01 mm) thick.
3. Touch-Up Materials: As recommended by coating manufacturer for field application.

**F. Hardware**

1. For each door, include weatherstripping, sill sweep strip, and threshold.
2. Other Door Hardware: See Section 08 71 00.
3. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
4. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
5. 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.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.



- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. 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 in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.
- 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 Substantial Completion.

**END OF SECTION**

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**SECTION 08 71 00  
DOOR HARDWARE****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section includes the following:
  - 1. Commercial door hardware.
  - 2. Cylinders for doors specified in other Sections.
  - 3. Electrified door hardware.

**1.02 SUBMITTALS**

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include details of electrified door hardware and wiring diagrams.
- C. Samples: Samples of products included in submittals shall be supplied upon request for review.
- D. Door Hardware Schedule: Organized into door hardware sets indicating type, style, function, size, label, hand, manufacturer, fasteners, location, degree of opening, and finish of each door hardware item. Include description of each electrified door hardware function, wiring diagrams and sequence of operation.
- E. Keying Schedule: Detail Owner's final keying instructions for locks in the form of a schematic.

**1.03 QUALITY ASSURANCE**

- A. Supplier Qualifications:
  - 1. Person who is or employs a qualified DHI Architectural Hardware Consultant.
  - 2. Shall have supplied jobs of similar size and value.
  - 3. Shall be a factory authorized supplier of any products submitted.
  - 4. Shall have been in the business of supplying finish hardware for a minimum of five years.
- B. Source Limitations: Obtain electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that are listed to perform electrical modifications, by a testing and inspecting agency acceptable to authorities having jurisdiction, are acceptable.
- C. Keying Conference: Conduct conference at Project site. Incorporate keying conference decisions into final keying schedule. Submit schematic to manufacturer at time of order.
- D. Pre-installation Conference: Conduct conference at Project site.
- E. Keys: All keys shall be labeled and copy of finalized schematic delivered to owner by registered mail. All keys shall be stamped in a manner the owner requests.
- F. Templates: Obtain and distribute templates for doors, frames, finish hardware and other work specified to be factory prepared for installing door hardware.
- G. Standards: Comply with BHMA A156 series standards, Grade 1, unless Grade 2 is indicated.
- H. Certified Products: Provide door hardware that is listed in BHMA directory of certified products.

**1.04 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within warranty period.
  - 1. Warranty Period for Manual Closers: 10 years from date of Substantial Completion. Closer body shall carry a life of the building warranty.

**PART 2 PRODUCTS****2.01 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.
- D. Shall comply with all code requirements.

## 2.02 PIVOTS AND HINGES

- A. Hinges:
  1. Manufacturers: Butt Hinges
    - a. Baldwin Hardware Corporation (BH).
    - b. HB Ives. An Allegion Security Group Company (IV).
    - c. McKinney Architectural Hardware. An ASSA Abloy group company. (MK).
  2. Butt hinges shall comply with ANSI 156.1, Grade 1.
    - a. Standard Weight Interior: TA2714 MK.
    - b. Standard Weight Exterior: TA2314 NRP SSF MK.
    - c. Heavy Weight Interior: T4A3786 MK.
    - d. Heavy Weight Exterior: T4A3386 NRP SSF MK.
  3. Continuous Hinges: Markar FM100.
  4. Manufacturers: Continuous Hinges
    - a. Pemko Manufacturing Company, An ASSA Abloy Group Company.
    - b. Select Products, Limited. SL3500
    - c. Stanley Hinge, A Stanley Security Group Company. 652HD UL
  5. General: Except for hinges to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units. Continuous hinges are to be pin and barrel, geared hinges will not be accepted. Base material is aluminum.
  6. Ball bearing or anti-friction bearing butt hinges shall be used on any door with a closer or overhead stop. Heavy weight hinges shall be used in accordance with manufacture's recommendations for door weight.
  7. Shall be full mortised unless indicated in hardware sets.
  8. Number of Hinges:
    - a. Butt Hinges: Two hinges for every door up to 60". One additional hinge for every additional 30" of door height.
  9. Hinge Size:
    - a. Butt Hinges: Shall meet manufactures requirements for size based on door weight and width.
  10. Hinge Base Metal: Unless otherwise indicated, provide the following:
    - a. Exterior Hinges: Stainless steel, with stainless-steel pin.
    - b. Interior Hinges: Steel, with steel pin.
    - c. Hinges for Fire-Rated Assemblies: Steel, with steel pin.
  11. Non-removable Pins: Provide set screw in hinge barrel that prevents removal of pin while door is closed; for outswinging exterior doors.
  12. Screws: Phillips flat-head screws; screw heads finished to match surface of hinges.
    - a. Metal Doors and Frames: Machine screws (drilled and tapped holes).
    - b. Wood Doors and Frames: Wood screws.
    - c. Fire-Rated Wood Doors: Threaded-to-the-head wood screws.
  13. Pivot Sets: Shall meet or exceed ANSI #C07162.
  14. Pivot Set: Model 147 626 (RF).
  15. Intermediate Pivots: Shall meet or exceed ANSI # C07321.
  16. Intermediate Pivot: Model M19 626 (RF).

17. Manufacturers: Pivots
  - a. DormaKaba. (DO).
  - b. HB Ives. An Allegion Security Group Company. (IV).
  - c. Rixson Firemark. An ASSA Abloy Security Group Company. (RF).

### 2.03 MECHANICAL LOCKS AND LATCHES

- A. Manufacturers:
  1. Accurate Lock & Hardware. 9000/9100 series. (AL).
  2. Corbin Russwin Architectural Hardware. An ASSA Abloy Group Company. ML2000 102T series (RU).
  3. Sargent Lock. An ASSA Abloy Group Company. 8200 MDO series. (SA).
- B. Lockset shall meet ANSI A156. 13, Grade 1.
- C. Lockset Design: 102T by Corbin Russwin (RU).
- D. Levers shall be solid cast or wrought, BHMA 630.
- E. Dummy Trim: Lever, trim and finish shall match lockset design.
- F. Latch bolts shall have a mechanical anti-friction latches. Plastic inserts will not be permitted.
- G. Lock Throw: Comply with labeled fire door requirements.
- H. Backset: 2-3/4 inches, unless otherwise indicated.

### 2.04 BOLTS

- A. Fire-Rated Doors: Comply with labeled fire door requirements.
- B. Surface Bolts: Flush bolt heads of minimum 1/2-inch- (12.7-mm-) diameter rods of brass, bronze, or stainless steel with minimum 12-inch- (305-mm-) long rod.
- C. Manufacturers:
  1. Door Controls International (DCI).
  2. McKinney Architectural Hardware. An ASSA Abloy Group Company. (MK).
  3. Rockwood Manufacturing. An ASSA Abloy Group Company (RM).
- D. Flush Bolts: BHMA Grade 1, designed for mortising into door edge.
  1. Manufacturers:
    - a. Door Controls International (DCI).
    - b. McKinney Architectural Hardware. An ASSA Abloy Group Company. (MK).
    - c. Rockwood Manufacturing. An ASSA Abloy Group Company (RM).

### 2.05 EXIT DEVICES

- A. Manufacturers:
  1. Corbin Russwin Architectural Hardware Inc. An ASSA Abloy Group Company. ED4000 series (RU).
  2. Von Duprin. An Allegion Security Group Company. 35 series. (VD).
  3. Sargent Lock. An ASSA Abloy Group Company. 80 series. (SA).
- B. Panic Exit Devices: Shall be listed and labeled for panic protection, based on testing according to UL 305.
- C. Fire Exit Devices: Shall complying with NFPA 80, listed and labeled for fire and panic protection, based on testing according to UL 305 and NFPA 252.
- D. Shall meet ANSI A156.3, Grade 1.
- E. All latch bolts shall be deadlocking.
- F. All exposed metal shall be in BHMA 630. Aluminum anodized finish will not be accepted.
- G. Outside operating trim shall be through-bolted with concealed fasteners.
- H. Operating trim shall be freewheeling with clutch mechanism allowing lever to rotate 60 degrees when locked to prevent vandalism.

- I. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

## 2.06 OPERATING TRIM

- A. Push-Pull Design: As scheduled.
  1. Manufacturers:
    - a. Baldwin Hardware Corporation (BH).
    - b. Door Controls International. (DHI).
    - c. Rockwood Manufacturing. An ASSA Abloy Group Company. (RM).

## 2.07 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3.
  1. Carry-Open Bars: Where a coordinator is specified, provide carry-open bars for inactive leaves of pairs of doors.
- B. Manufacturers:
  1. Door Controls International (DCI).
  2. McKinney Architectural Hardware. An ASSA Abloy Group Company. (MK).
  3. Rockwood Manufacturing. An ASSA Abloy Group Company. (RM).

## 2.08 CLOSERS

- A. Shall be certified ANSI A156.4 Grade 1, non-handed.
- B. Surface-Mounted Closers:
  1. Shall have multi sized spring power adjustment for sizes 2 thru 6 or 1thru 4 for barrier free applications.
  2. Shall have full covers.
  3. Rack and Pinion shall always have minimum two full gears engaged.
  4. Stop arms, where specified, shall be Unitrol type with spring stop and backcheck at 65 degrees.
  5. Provide soffit plate for parallel arm applications using aluminum frames with blade stops or snap on stops.
  6. Provide drop plates as required.
  7. Provide accessory bracket for the proper installation of door closers.
- C. Manufacturers:
  1. Corbin Russwin Architectural Hardware, Inc. An ASSA Abloy Group Company. DC6200 series (RU).
  2. Norton Door Controls. An ASSA Abloy Group Company. 7500 series. (NO).
  3. LCN Closers. An Allegion Security Group Company 4040XP series. (LC).
- D. Size of Units: Factory-sized, adjustable to meet field conditions and requirements for opening force.

## 2.09 PROTECTIVE TRIM UNITS

- A. Protective Trim Units: Sized 2 inches less than door width on push side and 1 inch less than door width on pull side, by height scheduled or indicated. Plates to be applied ½" from bottom of door to bottom of plate and centered on the door.
  1. Shall be beveled on three sides.
  2. Material: Metal.
    - a. Fasten to door using fasteners provided by manufacturer.
- B. Manufactures:
  1. Baldwin Hardware Corporation (BH).
  2. Door Controls International. (DHI).
  3. Rockwood Manufacturing. An ASSA Abloy Group Company. (RM).

## 2.10 STOPS AND HOLDERS

- A. All doors shall have a doorstop that effectively protects any and all doors, walls and finish hardware that comes into contact with the operation of the function of the door. Wall stops are the preferred method.

- B. Provide sufficient blocking and reinforcement for secure installation and operation of all stops and holders.
- C. Overhead stops shall be provided where noted in hardware sets or if wall stop can not stop and protect the doors, walls or finish hardware from damage.
- D. Oversized floor stops are only permitted for exterior doors.
- E. Closer stop arms are only permitted if specified in hardware set.
- F. Manufacturers:
  - 1. Glynn Johnson. An Allegion Security Group Company. (IV).
  - 2. Rixson-Firemark, Inc. An ASSA Abloy Group Company. (RF).
  - 3. Rockwood Manufacturing. An ASSA Abloy Group Company. (RM).
- G. Silencers for Door Frames: Neoprene or rubber; fabricated for drilled-in application to frame.

### **2.11 DOOR GASKETING AND THRESHOLDS**

- A. Door Gasketing: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide non-corrosive fasteners for exterior applications and elsewhere as indicated.
- B. Manufacturers:
  - 1. Gasketing:
    - a. McKinney Architectural Hardware. An ASSA Abloy Group Company. (MK).
    - b. National Guard Products. (NGP)
    - c. Pemko Manufacturing Co., Inc. An ASSA Abloy Group Company. (PEM).
- C. Air Leakage: Not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.
- D. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled, based on testing according to UL 1784.
- E. Fire-Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled, based on testing according to UL 10C or NFPA 252.
- F. Sound-Rated Gasketing: Assemblies that are listed and labeled, based on testing according to ASTM E 1408.
- G. Gasketing Materials: Comply with ASTM D 2000 and AAMA 701/702.
- H. Thresholds: Of type scheduled or indicated.
  - 1. Manufacturers:
    - a. McKinney Architectural Hardware. An ASSA Abloy Group Company. (MK).
    - b. National Guard Products. (NGP)
    - c. Pemko Manufacturing Co., An ASSA Abloy Group Company.Inc. (PEM).

### **2.12 SLIDING AND FOLDING DOOR HARDWARE**

- A. Folding Door Hardware: Complete sets consisting of overhead rails, hangers, supports, bumpers, floor guides, and accessories indicated.
- B. Manufacturers:
  - 1. Cox, Arthur & Sons, Incorporated (ACS).
  - 2. Henderson, P. C. Inc.; Div. of Hepworth PLC (PCH).
  - 3. Johnson, L. E. Products, Inc. (LEJ).
  - 4. Lawrence Brothers, Inc. (LB).
- C. Interior Doors: Provide door hardware for interior bi-folding doors when not furnished as part of door package.
- D. Bi-folding Door Hardware: Rated for door panels weighing up to 50 lb (23 kg).
- E. Multiple Folding Door Hardware: Rated for door panels weighing up to 30 lb (14 kg).

**2.13 CYLINDERS, KEYING, AND STRIKES**

- A. Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
  - 1. Manufacturer of cylinders shall be the same as the lock manufacturer. Design is Corbin Russwin Access 3 High Security patented keyway.
  - 2. Number of Pins: Six.
  - 3. Interchangeable Cores: Manufacturer's standard; finish face to match lockset.
  - 4. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys with core only removal. Provide 10 construction master keys.
  - 5. Construction temporary cores must be returned, in good condition, to the hardware distributor.
  - 6. Final cores and keys must be delivered to the owner via priority US mail.
  - 7. Final cores shall not be installed before construction is completed. Owner shall be educated on installation of the cores by the general contractor.
  - 8. Cylinders shall be inscribed with concealed key control.
  - 9. Final Keys: Include 5 GM keys, 30 masterkeys, 4 control keys, 3 change keys per cylinder and 5 electrical, janitor and IT keys each. Additionally, provide 50 key blanks with side biting cut to match system.
- B. Keying System: Factory-registered keying system. All cylinders shall employ a patented locking mechanism that requires the use of a patented key and is furnished with a minimum of 6 pins.  
Supply owner with proper key / cylinder ordering forms from manufacturer. Keys and cylinders may only be ordered through factory approved distributors that are in good standing with the DHI.
  - 1. Keys: Provide nickel-silver keys permanently inscribed with a visual key control number and "DO NOT DUPLICATE" notation. In addition to one extra blank key for each lock, provide three change keys and five master keys. Extra keys will only be available from manufacturer, through an authorized distributor with the proper permission forms from the building owner.
- C. Key Control System: Include key-holding hooks, labels, key tags with self-locking key holders, envelopes, and markers. Contain system in wall-mounted type metal cabinet with baked-enamel finish. Include cross-index system set up by key control manufacturer, with card index.
- D. Manufacturers:
  - 1. Key Control Systems, Inc. (KCS).
  - 2. Major Metalfab Co. (MM).
  - 3. Sargent Manufacturing Company. An ASSA Abloy Group Company. (SA).
  - 4. Sunroc Corporation (SUN).
- E. Strikes: 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.

**2.14 FABRICATION**

- A. Base Metals: Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18 for finishes. Do not furnish manufacturer's standard materials if different from specified standard.
- B. Fasteners: Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated. Provide steel machine or wood screws or steel through bolts for fire-rated applications.
- C. Spacers or Sex Bolts: For through bolting of hollow metal doors.
- D. Fasteners for Wood Doors: Comply with requirements of DHI WDHS.2, "Recommended Fasteners for Wood Doors."
- E. Finishes: Comply with BHMA A156.18.

**2.15 AUTOMATIC DOOR OPERATORS (HEAVY DUTY-LOW ENERGY)**

- A. Owner's manual will be supplied as part of the close out documentation.
- B. Quality assurance
  - 1. Operator shall be manufactured by an AAADM registered manufacture. Manufactured to meet or exceed the American National Standard for Low Energy Power Operated Pedestrian Doors



ANSI / BHMA 156.19.

- C. Source Limitations: Obtain automatic door operators and installation services through one source from a single manufacturer.
- D. Installer Qualifications
  1. Equipment must be installed by an AAADM Certified, record-USA factory trained and record-USA authorized company with a minimum of 5 years experience in the installation this the specified product type.
  2. Installing company of the equipment, to provide local central dispatch system for warranty service, this is to be available 24 hours a day, 365 days per year. A sticker will be placed in a prominent position on the header of each installed unit giving details of local service company, name and telephone number. If a SMART panel option is used, then details of the telephone number to be called will be programmed into the device.
- E. Warranty
  1. All automatic door components are warranted to be free of defects in materials or workmanship under normal use for a period of two years from the date of substantial completion.
- F. Manufacturer
  1. Norton Door Controls 6000 series.
  2. LCN 4600 series.
  3. Record-usa series 8100 Electromechanical Automatic Operator.
- G. Equipment
  1. The swing door operator consists of operator housing, swing power operator, electronic control, wire harnesses and connecting hardware.
  2. Automatic Swing Door Operator
    - a. Operator: Electro-mechanical operator, powered by 24 volt, 1/4 hp motor.
    - b. Operator is to be non-handed to ensure maximum versatility in adapting to varying field conditions. Opening Force shall be adjustable by means of one screw, to compensate for different manual push forces required on varying door widths.
    - c. The non-handed operator is completely contained in extruded aluminum housing. All aluminum sections are 6063-T5 alloy while the structural walls of the base plate have a minimum thickness of 0.187" (3/16") while the access cover (non-structural) has a minimum wall thickness of 0.094" (3/32"). The operator housing width by height shall not exceed 4-1/2" x 5". Length of operator housing determined by site conditions and/or specifications herein. Motor/gear box shall be secured to operator housing via tamper proof extruded channel on the back member of operator housing.
  3. Electronic Controls: Microprocessor controlled unit shall control the operation and switching of the swing power operator. The microprocessor control to provide low voltage power supply for all means of actuation. No external or auxiliary low voltage power source will be allowed. The controls include time delay for normal cycle.
  4. Connecting Hardware: Surface mounted operator is connected to the door by means of a steel door arm. The door arm is secured to the top rail of the swing door using one piece threaded tubular inserts for aluminum doors, 1/4-20 binding head and post screws (sex bolts) for wood and hollow metal doors. The standard power arm and connecting arm shall accommodate up to 12" reveals and opening angles to 120 degrees. The arm will be equipped with a mechanical device which will in the case of extreme force, "sheer" thus protecting any internal mechanical components from damage, in the case of abuse.
  5. Manual Use: The operator shall serve as a manual door closer in the direction of swing with or without electrical power.
  6. External Control: A three position switch will be mounted in the end cover of the housing, along with a "fault warning" LED. The switch will be clearly marked, ON/OFF/HOLD OPEN. The LED will flash if the microprocessor detects a fault of any kind.
  7. Simplified Access: An access port that eliminates the need to remove the cover for service or adjustment is included as standard and located on the bottom of the unit unless specified elsewhere.

8. Power Open: When an opening signal is received by the control unit, the door shall be opened at the operator-adjusted opening speed. Before the door is fully open at back check, it slows automatically to low speed. The motor stops when the selected door opening angle has been reached. The open position is held by the motor. If the door is obstructed while opening, it will either stop or reverse (field selectable).
  9. Field Adjustable Open Stop: The operator shall provide a field adjustable mechanical open stop to accommodate opening angles from 80 to 180 degrees.
  10. Normal Close: Closing shall be provided by means of spring; adjustable tension will be by means of a single screw.
  11. Power Close: Closing shall be provided by means of a spring and motor. When the hold open time has elapsed, the operator will close the door automatically, using spring force and motor. The door will slow to low speed at latch check before it reaches the fully closed position. The door is kept closed by spring power or extended closing force by the motor.
  12. Power Assist: Operator can be adjusted to lower the open forces when used manually. Power Assist will be active only while pushing or pulling the door and will allow the door to close when an opening force is no longer applied to the door.
  13. Electronic Dampening: Operator to include standard electric dampening system which automatically counteracts additional forces applied to the door during the opening or closing cycle by reducing door speed.
  14. Stack Pressure Feature: The electronic control allows for increases of forces to overcome stack pressure issues. The control automatically compensates for lower manual push forces when the door is used in manual mode. The door must comply with ANSI A156.19, when using this feature.
  15. Lock engage circuit: If locking is unsuccessful when the door reaches the closed position, the operator will automatically reverse open 10 degrees and reclose in an attempt to successfully lock the door.
  16. Test of Safety Sensors: If optional safety sensors are specified, the control will monitor the sensors before opening and closing the door. If sensors are not functioning correctly, automation is deactivated, and the door will function as a manual swing door with a door closer and a fault is registered in the controls log.
  17. Fire rated surface applied operators connect to the surface of an existing fire rated labelled door frame or wall. Connecting hardware and UL approved fire exit hardware is required. See UL materials directory.
  18. A separate contact will be provided that upon receipt of a signal from an external source (fire alarm), the unit will close if in an open condition and not operate as an automatic door, until the signal from the external source has been reset.
- H. Signage: Provide signage in accordance with ANSI/BHMA A156.19.
- I. Optional Features
1. M.A.R.T. panel LCD display: Will display the current status of the operator, any faults that the control sees and if required display a screen giving contact details for fault notification.
  2. Battery back-up: Accessibility and convenience at non-fire rated opening under power failure. The minimum size Uninterrupted Power Supply (UPS) should be rated at 1500VA.
- J. Push Plate Control Device
1. Actuation device is either:
    - a. Hard wired push plate switches. These will be either surface mounted with an appropriate enclosure or in a concealed single gang electrical box.
    - b. Radio controlled push plate switches.
    - c. Touch less Activation sensor plates, 4 ½ inch square microwave technology, adjustable from 2" to 24."
  2. Option: Suitable bollard for remotely mounting push plates in areas where no suitable mounting for existing methods of mounting the push plates exist.
  3. Option: Push to Activate - is a programmable feature. Push or pull the door open from any position, and the door will gently power open, time out and slowly close.
  4. Door can be used as a manual door with no damage to the operator.

5. Electrical Characteristics and Components
  - a. Power consumption must be less than or equal to the following: Nominal power 67 watts, Nominal current .08A at 120 VAC. Peak power consumption 2.9A, Standby .02A with power consumption of 13 watts.
  - b. OVERLOAD PROTECTION: Electric motor is equipped standard with a built-in thermal overload protection.
  - c. ELECTRICAL CONTRACTOR NOTE: provide two low voltage 18 gauge stranded wires from automatic operator to (50 feet max.) activation devices (if required).
6. ALUMINUM FINISHES
  - a. All exposed aluminum surfaces are dark bronze anodized (AAC23A44) or clear anodized (AAC22A31). Custom finishes such as stainless steel clad, powder coatings or paint are available, if specified (architect to provide color).
  - b. EXAMINATION
    - 1) Verify the openings are plumb and are dimensioned properly. Insure adequate support has been provided at the operator header. Proceed with the installation only after conditions are deemed satisfactory.
  - c. INSTALLATION AND ADJUSTMENT
    - 1) Install equipment in accordance with the manufacturers' installation instructions. Adjust equipment per instructions and current ANSI/BHMA 156.19 American National Standard for Power assist and low energy power operated doors.
    - 2) Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.
    - 3) Controls: terminate wire to: controls, press plates, safety sensors.

### PART 3 EXECUTION

#### 3.01 INSTALLATION

- A. Examine doors and frames for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- B. Steel Door and Frame Preparation: Comply with DHI A115 series. Drill and tap doors and frames for surface-applied hardware according to SDI 107.
- C. Wood Door Preparation: Comply with DHI A115-W series.
- D. Hardware Installation: Shall be in accordance to manufactures instructions.
- E. Mounting Heights: Comply with the following requirements, unless otherwise indicated:
  1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
  3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- F. Miscellaneous Accessories: Shall be provided as necessary for the proper and secure attachment of all hardware to doors and frames.
- G. Adjust and reinforce attachment substrates as necessary for proper installation and operation. Drill and tap units that are not factory prepared for fasteners. Space fasteners and anchors according to industry standards.
  1. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- H. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with accessibility requirements.
  1. Door Closers Adjustments:
    - a. Adjust sweep period so that from an open position of 70 degrees, the door will take at least three seconds to move to a point 3 inches from the latch, measured to the leading

edge of the door.

- b. Adjust back-check to slow the door opening at about 75 degrees, when door is forcibly opened beyond its pre-adjusted limits.

### **3.02 DOOR HARDWARE SETS**

## **HARDWARE SET 1.0**

Doors: 100A

EACH TO RECEIVE:

2	Set	Pivot Set	7226-SET US26D	Ives
2	EA	Intermediate Pivot	7226-INT US26D	Ives
2	EA	Electric Intermediate Pivot	7226PT-INT-TW8 US26D	Ives
1	EA	Concealed Vert Rod Exit	.RX 9947.DT .CON .626 .990DT(Std)	Von Duprin
1	EA	Concealed Vert Rod Exit	.QEL .RX 9947.NL .CON .626 .990NL(Std)	Von Duprin
1	EA	Cylinder	20-079 .626	Schlage
1	EA	Construction Core	23-030-ICX .50-231	Schlage
1	EA	Cylinder	23-030 .626 .GMK	Schlage
1	EA	Surface Closer	4111 .SCUSH .689 .TBSRT	LCN Closers
1	EA	Drop Plate	4110-18 .689	LCN Closers
1	EA	Shoe	4110-30 .689	LCN Closers
1	EA	Spacer	4110-61 .689	LCN Closers
1	EA	Door Operator	4642 .REGARM .689	LCN Closers
1	EA	Threshold	655A x 72" 224	Zero International Inc
2	EA	Sweep	8197AA x 36"	Zero International Inc
2	EA	Wire Harness	CON-26	Von Duprin
2	EA	Wire Harness	CON-192	Von Duprin
2	EA	Position Switch	679-05HM	Schlage Electronic
1	EA	Actuator	8310-853	LCN Closers
1	EA	Actuator	8310-855	LCN Closers
1	EA	Sensor	8310-878	LCN Closers
1	EA	Power Supply	PS902 .900-KL .900-2RS .900-BBK	Von Duprin

Seals and door bottoms by door manufacturer.

Operation:

Business hours: Doors are electronically unlocked allowing free ingress and egress. ADA ingress and egress by interior and exterior door switches (knowing act).

After hours: Doors are normally closed and locked. Presenting a valid credential will retract exit device latch and activate automatic opener allowing ingress. Free egress at all times by exit device push pad.

Automatic opener will be installed by the hardware supplier, not the aluminum storefront supplier. Installation will be complete including all wire pulls and programming. All other hardware will be turned over to aluminum storefront supplier. An onsite coordination meeting between electrician, security contractor, aluminum storefront supplier and hardware supplier will be held to review responsibilities of each contractor.

Card reader provided by owner.

## **HARDWARE SET 2.0**

Doors: 100AB

EACH TO RECEIVE:

2	Set	Pivot Set	7226-SET US26D	Ives
2	EA	Intermediate Pivot	7226-INT US26D	Ives
2	EA	Electric Intermediate Pivot	7226PT-INT-TW8 US26D	Ives
1	EA	Concealed Vert Rod Exit	.RX 9947.DT .CON .626 .990DT(Std)	Von Duprin
1	EA	Concealed Vert Rod Exit	.QEL .RX 9947.NL .CON .626 .990NL(Std)	Von Duprin
1	EA	Cylinder	20-079 .626	Schlage
1	EA	Construction Core	23-030-ICX .50-231	Schlage
1	EA	Cylinder	23-030 .626 .GMK	Schlage
1	EA	Surface Closer	4111 .SCUSH .689 .TBSRT	LCN Closers
1	EA	Drop Plate	4110-18 .689	LCN Closers
1	EA	Shoe	4110-30 .689	LCN Closers
1	EA	Spacer	4110-61 .689	LCN Closers
1	EA	Door Operator	4642 .REGARM .689	LCN Closers
2	EA	Wire Harness	CON-26	Von Duprin
2	EA	Wire Harness	CON-192	Von Duprin
2	EA	Position Switch	679-05HM	Schlage Electronic
1	EA	Actuator	8310-853	LCN Closers
1	EA	Sensor	8310-878	LCN Closers
1	EA	Power Supply	PS902 .900-KL .900-2RS .900-BBK	Von Duprin

Seals and door bottoms by door manufacturer.

Operation:

Business hours: Doors are electronically unlocked allowing free ingress and egress. ADA ingress and egress by interior and exterior door switches (knowing act).

After hours: Doors are normally closed and locked. Presenting a valid credential will retract exit device latch and activate automatic opener allowing ingress. Free egress at all times by exit device push pad.

Automatic opener will be installed by the hardware supplier, not the aluminum storefront supplier. Installation will be complete including all wire pulls and programming. All other hardware will be turned over to aluminum storefront supplier.

## **HARDWARE SET 3.0**

Doors: 101B, 101C, 102C, 103D, 105C

EACH TO RECEIVE:

3	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 630 NRP	Ives
1	EA	Rim Exit Device	.QEL .RX 99.NL .CON .626 .4' .990NL(Std)	Von Duprin
1	EA	Cylinder	20-079 .626	Schlage
1	EA	Construction Core	23-030-ICX .50-231	Schlage
1	EA	Cylinder	23-030 .626 .GMK	Schlage
1	EA	Surface Closer	4111 .SCUSH .689 .TBSRT	LCN Closers
1	EA	Kick Plate	8400 B-CS 10" x 38" US32D	Ives
1	EA	Threshold	655A x 40" 224	Zero International Inc
1	EA	Rain Drip	142AA x 44"	Zero International Inc
1	EA	Gasketing	429AA x 40" x 84"	Zero International Inc
1	EA	Sweep	8197AA x 40"	Zero International Inc
1	EA	Wire Harness	CON-26	Von Duprin
1	EA	Wire Harness	CON-192	Von Duprin
1	EA	Position Switch	679-05HM	Schlage Electronic
1	EA	Power Supply	PS902 .900-KL .900-2RS .900-BBK	Von Duprin

Operation:

Door is normally closed and locked. Presenting a valid credential will retract exit device latch allowing ingress. Free egress at all times by exit device push pad.

Card reader provided by owner.

### **HARDWARE SET 4.0**

Doors: 102B, 105B

EACH TO RECEIVE:

6	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	Ives
2	EA	Surface Vert Rod Exit	9927.L .626 .4' .LBR .996L(Std) .03	Von Duprin
2	EA	Cylinder	20-079 .626	Schlage
2	EA	Construction Core	23-030-ICX .50-231	Schlage
2	EA	Cylinder	23-030 .626 .GMK	Schlage
2	EA	Surface Closer	4111 .EDA .689 .TBSRT	LCN Closers
2	EA	Kick Plate	8400 B-CS 10" x 40" US32D	Ives
2	EA	Wall Stop	WS407CCV 630	Ives
2	EA	Astragal	8192AA x 84"	Zero International Inc
2	EA	Silencer	SR64-GRY	Ives

### **HARDWARE SET 5.0**

Doors: 105A

EACH TO RECEIVE:

6	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	Ives
1	EA	Flush Bolt	FB51T 630	Ives
1	EA	Classroom Lock	L9070 .J .P6 .03A .626	Schlage
1	EA	Construction Core	23-030-ICX .50-231	Schlage
1	EA	Cylinder	23-030 .626 .GMK	Schlage
2	EA	Surface Closer	4111 .EDA .689 .TBSRT	LCN Closers
2	EA	Wall Stop	WS407CCV 630	Ives
2	EA	Astragal	8192AA x 84"	Zero International Inc
2	EA	Silencer	SR64-GRY	Ives

### **HARDWARE SET 6.0**

Doors: 111

EACH TO RECEIVE:

3	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	Ives
1	EA	Classroom Lock	L9070 .J .P6 .03A .626	Schlage
1	EA	Construction Core	23-030-ICX .50-231	Schlage
1	EA	Cylinder	23-030 .626 .GMK	Schlage
1	EA	Surface Closer	4111 .EDA .689 .TBSRT	LCN Closers
1	EA	Kick Plate	8400 B-CS 10" x 40" US32D	Ives
1	EA	Wall Stop	WS407CCV 630	Ives
3	EA	Silencer	SR64-GRY	Ives

### **HARDWARE SET 7.0**

Doors: 102A, 103A, 103B, 103C, 109A

EACH TO RECEIVE:

3	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	Ives
1	EA	Classroom Lock	L9070 .J .P6 .03A .626	Schlage
1	EA	Construction Core	23-030-ICX .50-231	Schlage
1	EA	Cylinder	23-030 .626 .GMK	Schlage
1	EA	Wall Stop	WS407CCV 630	Ives
3	EA	Silencer	SR64-GRY	Ives

### **HARDWARE SET 8.0**

Doors: 100B, 108, 109, 112, 113

EACH TO RECEIVE:

3	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	Ives
1	EA	Office/Entry Lock	L9050 .J .P6 .03A .626	Schlage
1	EA	Construction Core	23-030-ICX .50-231	Schlage
1	EA	Cylinder	23-030 .626 .GMK	Schlage
1	EA	Wall Stop	WS407CCV 630	Ives
3	EA	Silencer	SR64-GRY	Ives

### **HARDWARE SET 9.0**

Doors: 104, 110

EACH TO RECEIVE:

3	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	Ives
1	EA	Storeroom Lock	L9080 .J .P6 .03A .626	Schlage
1	EA	Construction Core	23-030-ICX .50-231	Schlage
1	EA	Cylinder	23-030 .626 .GMK	Schlage
1	EA	Surface Closer	4011 .REGARM .689 .TBSRT	LCN Closers
1	EA	Kick Plate	8400 B-CS 10" x 40" US32D	Ives
1	EA	Wall Stop	WS407CCV 630	Ives
3	EA	Silencer	SR64-GRY	Ives

### **HARDWARE SET 10.0**

Doors: 106, 107

EACH TO RECEIVE:

3	EA	Hinge, Full Mortise, Hvy Wt	5BB1HW 4-1/2" x 4-1/2" 652	Ives
1	EA	Push Plate	8200-4x16 630	Ives
1	EA	Pull Plate	8303-0-4x16 630	Ives
1	EA	Surface Closer	4011 .REGARM .689 .TBSRT	LCN Closers
1	EA	Kick Plate	8400 B-CS 10" x 40" US32D	Ives
1	EA	Wall Stop	WS407CCV 630	Ives
3	EA	Silencer	SR64-GRY	Ives



**SECTION 08 80 00  
GLAZING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Insulating glass units.
- B. Glazing units.
- C. 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 C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016 (Reapproved 2023).
- H. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.
- I. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.
- J. GANA (GM) - GANA Glazing Manual; 2022.
- K. GANA (SM) - GANA Sealant Manual; 2008.
- L. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2023.
- M. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2023.
- N. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

**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. Solarban R67 Solar Control Low-E Glass.
  - 6. 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.
  - 1. In conjunction with weather barrier related materials described in other sections, as follows:
- 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. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
4. Impact Resistant Safety Glass: Complies with ANSI Z97.1 and 16 CFR 1201 criteria; Class A/Category II.

#### 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 air.
  3. Outboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
    - a. Tint: Clear.
    - 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: 0.28, nominal.
  7. Visible Light Transmittance (VLT): 64 percent, nominal.
  8. Solar Heat Gain Coefficient (SHGC): 0.27 percent, nominal.
  9. Product: Solarban 70XL (2) + 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.
- E. Type IG-3 - Insulating Glass Units: Spandrel glazing.
  1. Applications: Exterior spandrel glazing unless otherwise indicated.
  2. Space between lites filled with air.
  3. Outboard Lite: Annealed float glass, 1/4 inch (6.4 mm) thick, minimum.
    - a. Tint: Clear.
    - b. Coating: Same as on vision units, on #2 surface.
  4. Inboard Lite: Heat strengthened float glass, 1/4 inch (6.4 mm) thick, minimum.
    - a. Tint: Clear.
    - b. Opacifier: Ceramic frit, on #4 surface.
      - 1) Opacifier Color: Black.
  5. Total Thickness: 1 inch (25.4 mm).

**2.05 GLAZING UNITS**

- A. Type G-1 -Monolithic Interior Vision Glazing:
  - 1. Applications: Interior glazing unless otherwise indicated.
  - 2. Glass Type: Annealed float glass.
  - 3. Tint: Clear.
  - 4. Thickness: 1/4 inch (6.4 mm), nominal.
- B. Type G-2 -Monolithic Safety Glazing: Non-fire-rated.
  - 1. Applications:
    - a. Glazed lites in doors, except fire doors.
    - b. Glazed sidelights to doors, except in fire-rated walls and partitions.
    - c. Other locations required by applicable federal, state, and local codes and regulations.
    - d. Other locations indicated on drawings.
  - 2. Glass Type: Fully tempered safety glass as specified.
  - 3. Tint: Clear.

**2.06 ACCESSORIES**

- A. Setting Blocks: Silicone, 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, and paint.

### **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**

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Division 08

New Facility For  
North Granville County Senior Center

**SECTION 08 83 00  
MIRRORS**

**PART 2 PRODUCTS**

**1.01 MATERIALS**

**END OF SECTION**

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**SECTION 08 88 50  
SECURITY GLAZING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Furnish all labor, materials tools, equipment necessary to complete all security glass and glazing work shown on the drawings and as specified herein.

**1.02 REFERENCE STANDARDS**

- A. Glass Association of North America Glazing Manual, Latest Edition.
- B. ASTM F1915 – 05(2012), Standard Test Methods for Glazing for Detention Facilities.
- C. ASTM D1044-13, Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion.
- D. CPSC 16 CFR Part 1201, Safety Standard for Architectural Glazing materials.
- E. ASTM C1036-01, Standard Specification for Flat Glass.
- F. ASTM C1349-10, Standard Specification for Architectural Flat Glass Clad Polycarbonate.
- G. ASTM C1172-14, Standard Specification for Laminated Architectural Flat Glass.
- H. ASTM E2188-10, Standard Test Methods for Insulating Glass Unit Performance.
- I. ASTM F1592-12, Standard Test Methods for Detention Hollow Metal Vision Systems.
- J. ANSI Z26.1, American National Standard Institute Safety Code for Glazing Materials.
- K. NFPA 252, Standard Methods of Fire Tests of Door Assemblies.
- L. NFPA 257, Standard on Fire Test for Window and Glass Block Assemblies.
- M. UL 752, Standard for Bullet-Resisting Equipment.
- N. ASTM Committee F33 on Detention and Correctional Facilities.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene preinstallation meeting one week before starting work of this section; require attendance by each of affected installers. Meet at project site for purpose of reviewing products, verifying that openings are correctly sized and within tolerance and installation methods selected, and procedures to be followed in performing the work.

**1.04 SUBMITTALS**

- A. Provide 2 each of the most recent product data sheets of the material being submitted.
- B. Provide two 12" x 12" samples of each type of security glazing product to be used on the project.
- C. Installer shall provide a detail showing proposed installation technique with all spacing and caulking, sealants, setting blocks with security glazing manufacturer's compatibility approval attached. Approval by the sealant manufacturer is not acceptable.
- D. Warranty: Provide a signed copy of the manufacturer's warranty for the specified security glazing product.
- E. Any other documentation the manufacturer deems necessary to assure compliance to the specification.

**1.05 QUALITY ASSURANCE**

- A. Comply with ASTM F1915 – 05(2012) containment testing for forced entry/containment performance. Testing shall be in the name of and wholly owned by the company manufacturing the submitted product. Second party or round robin testing is not acceptable.
- B. Comply with Underwriters Laboratory 752 for ballistic requirements and supply only UL "listed" products.
- C. Experience Criteria: Manufacturers not prior approved shall provide evidence of at least five years experience manufacturing specified item and provide written documentation of at least 5 facilities having used the identically specified product.

- D. Security Glazing substitutions must be made at least 15 days prior to bid date.
- E. Single Source Responsibility: Provide materials obtained from one source for each type of glass and glazing products specified.

### 1.06 JOB CONDITIONS

- A. Weather Conditions: Do not proceed with installation of sealants under adverse weather conditions or when temperatures are outside manufacturer's recommended range for installation.
- B. Installer shall inspect and notify the General Contractor of any conditions that may affect the successful installation of the glazing. This shall include identification of any cleaners, solvents etc. not compatible with security glazing or polycarbonate.

### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the site in unopened containers, labeled plainly with manufacturer's names and brands. Store glass and setting materials in safe, dry locations and do not unpack until needed for installation. Handle and install materials in a manner that will protect them from damage.
- B. Storage: Protect glass and glazing materials during delivery, storage and handling, to comply with manufacturer's direction and as required to prevent edge damage to glass and damage to glass and glazing materials from effects of moisture (including condensation), of temperature changes, of direct exposure to sun and from other causes.
- C. Tag all products with markings that show proper installation locations.
- D. Items found to be defective through manufacturing; transit damage, field installation, etc. shall be replaced within a three-week period. Special shipment and manufacturing arrangements shall be arranged to accomplish this requirement.

### 1.08 WARRANTY

- A. Glass Clad Polycarbonate: Shall be written warranty by the security glazing manufacturer agreeing to provide replacement material FOB point of manufacturer, freight prepaid and allowed, in the event of product failure or defect for a period of 5 years from date of shipment. Defect shall be defined as delamination, yellowing or hazing – damage as a result of chemical attack is not covered or use of non-approved cleaners or chemicals are also not covered.
- B. Laminated Polycarbonate: Shall be written warranty by the security glazing manufacturer agreeing to provide replacement material FOB point of manufacturer, freight prepaid and allowed, in the event of product failure or defect for a period of 10 years from date of shipment. Defect shall be defined as delamination, yellowing or hazing.
- C. Air-Gap Units: Shall be written warranty by the security glazing manufacturer agreeing to provide replacement material FOB point of manufacturer, freight prepaid and allowed, in the event of product failure for a period of one year from date of shipment. Defect shall be defined as edge seal failure or fogging.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Global Security Glazing: [www.security-glazing.com](http://www.security-glazing.com).
- B. LTI Smart Glass: [www.ltisg.com](http://www.ltisg.com).
- C. Sabic Innovative Plastics: [www.sabic.com](http://www.sabic.com).
- D. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 CATEGORY

- A. Polycarbonate: Laminated or monolithic polycarbonate shall be extruded UV stabilized but when laminated uses various layers of urethane interlayers and thickness to achieve required performance levels. Polycarbonate laminates shall have a flexural strength of not less than 13,500 PSI: (ASTM D-790) 180 degrees F continuous service temperature. Products must conform to all applicable IBC building codes with a CC-1 flammability performance rating.

**2.03 MATERIALS**

- A. Compatibility: Provide materials with proven record of compatibility with surface contacted in installation.
- B. Setting Blocks: Neoprene, EPDM, or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore a durometer hardness.
- C. Edge Block: Neoprene, EPDM, or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.
- D. Glazing Sealants:
  - 1. Comply with recommendation of sealant and glass manufacturers for selection of glazing sealants that have performance characteristics suitable for applications indicated and conditions at time of installation.
  - 2. Select sealants with proven compatibility with surfaces contacted in the installation and under service conditions indicated, as demonstrated by testing and field experience.
    - a. Colors: Provide color of exposed sealant as selected by Architect from Chemically Strengthened Glass's standard colors.
  - 3. Silicone Glazing Sealant: Single component elastomeric silicone sealant complying with FS TT-S-001543, Class A, nonsag; and with ASTM C920, Type S, Grade NS, Class 25, Use G and, as applicable to use indicated, Uses A and O; and with the following requirements:
    - a. High-Modulus Silicone Glazing Sealant Manufacturer's standard high-modulus acid-curing sealant.
  - 4. Preformed Butyl-Polyisobutylene Glazing Tape: Blend of butylpolyisobutylene rubber with solids content of 100%, in extruded tape form, complying with AAMA 807.1, packaged on rolls with a release paper on side, with or without continuous spacer rod as recommended by manufacturers of tapes and glass for application indicated.

**2.04 GLAZING**

- A. Type SG-1: 3/8" nominal, 2 ply laminated polycarbonate, ASTM F1915 Security Grade 3 (20 min) rated, Lexgard MPC- 375, or approved equal. Clear.

**PART 3 EXECUTION****3.01 GENERAL**

- A. Examine the areas and conditions under which installation is to occur and document conditions detrimental to the proper and timely completion of the work. Work should not proceed until the appropriate trade has corrected unsatisfactory conditions.
- B. Distribute glass assemblies to installation locations immediately prior to installation, complying with all applicable product handling requirements. Coordinate timing of distribution.
- C. Remove applied glazing stops and their fasteners. Clean glazing channel or other framing members to receive glass immediately before glazing. Remove coatings that are not firmly bonded to the substrate. Remove lacquer from metal surfaces wherever elastomeric sealants are used. Apply primer or sealer to joint surfaces wherever recommended by sealant manufacturer.
- D. Protect glass assemblies from damage at all times during handling. Inspect immediately before installation, and discard and replace glass assemblies if edge damage or face imperfections are observed, or if tong marks will be exposed when installation is completed.
- E. Do not attempt to cut, seam, and nip or abrade insulating glass or glass which is tempered.
- F. Cut and install insulating glass as recommended in "Technical Service Report No. 104C" by PPG Industries, or similar report by other glass manufacturer.
- G. Comply with combined printed recommendations of glass manufacturers of sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those referenced glazing standards.
- H. Glazing channel dimensions as detailed by supplier to provide for 1" bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Installer must comply with manufacturer's recommendations and coordinate with hollow metal details.

- I. Protect glass from edge damage during handling and installation. Use a rolling block in rotating glass units to prevent damage to glass corners. Glass shall not impact metal framing. Use suction cups to shift glass units within openings. Do not raise or shift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge, which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.
- J. Apply primers to joint surfaces where required for adhesion of sealants, as determined by sealant-substrate testing.
- K. All polycarbonate glazing exposed to direct sunlight shall have its masking entirely removed and recovered with plastic poly taped to the frame. Failure to remove the factory-applied polycling masking in direct sunlight may cause staining or masking becoming baked on and extremely difficult to get off.

### 3.02 GLAZING MATERIALS

- A. Compatibility: Provide materials with proven record of compatibility with surface contacted in installation.
- B. Setting Blocks: Neoprene, EPDM, or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore a durometer hardness.
- C. Edge Block: Neoprene, EPDM, or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.
- D. Glazing Sealants:
  - 1. Comply with recommendation of sealant and glass manufacturers for selection of glazing sealants that have performance characteristics suitable for applications indicated and conditions at time of installation.
  - 2. Select sealants with proven compatibility with surfaces contacted in the installation and under service conditions indicated, as demonstrated by testing and field experience.
    - a. Colors: Provide color of exposed sealant as selected by Architect from Chemically Strengthened Glass's standard colors.
    - b. Silicone Glazing Sealant: Single component elastomeric silicone sealant complying with FS TT-S-001543, Class A, nonsag; and with ASTM C920, Type S, Grade NS, Class 25, Use G and, as applicable to use indicated, Uses A and O; and with the following requirements:
      - 1) High-Modulus Silicone Glazing Sealant Manufacturer's standard high-modulus acid-curing sealant.
    - c. Preformed Butyl-Polyisobutylene Glazing Tape: Blend of butylpolyisobutylene rubber with solids content of 100%, in extruded tape form, complying with AAMA 807.1, packaged on rolls with a release paper on side, with or without continuous spacer rod as recommended by manufacturers of tapes and glass for application indicated.

### 3.03 INSTALLATION

- A. Clean glazing channels and other framing members to receive glass, immediately before glazing. Remove coatings that are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.
- B. Install setting blocks of proper size in sill rabbet, located one-quarter of glass width from each corner, but no closer than 6" unless otherwise required. Set blocks in thin course of sealant that is acceptable for heel bead use.
- C. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.
- D. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.
- E. Provide compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and from adhering to joints back surface as well as to control depth of sealant for optimum performance,

unless otherwise indicated.

- F. Force sealants into glazing channels to eliminate voids and to ensure complete "wetting" or bond or sealant to glass and channel surfaces.
- G. Install pressurized tapes and gaskets to protrude slightly out of channel, so as to eliminate dirt and moisture pockets.
- H. Provide spacers inside and outside of proper size and spacing, for glass sizes larger than 50 united inches, except where gaskets are used for glazing. Spacers should have 1/8-inch minimum bite on glass.
- I. Tool exposed surfaces of glazing sealants to provide a substantial "wash" away from glass. Clean and trim excess glazing materials from glass, stops and frames promptly after installation to eliminate stains and discolorations.

### **3.04 CLEANING**

- A. Proper coordination of cleaning the security glazing shall be the sole responsibility of the General Contractor (GC). It is highly recommended that a record of the cleaning instructions being provided to the GC, Installer, Painter, Owner, etc. be maintained and recorded. The glazing manufacturer shall not be responsible for improper cleaning solutions and subsequent chemical attack on the polycarbonate. Chemical attack is not a warranty item.

### **3.05 PROTECTION**

- A. Protect glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances to come into contact with glass, remove immediately by method recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.

**END OF SECTION**

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**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.
  - 2. Carpet tile.
  - 3. Thin-set ceramic tile and stone tile.
- B. Preparation of new concrete floor slabs for installation of floor coverings.
- C. Testing of concrete floor slabs for alkalinity (pH).
- D. Remediation of concrete floor slabs due to unsatisfactory 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.
- E. Patching compound.
- F. Remedial floor coatings.

**1.02 REFERENCE STANDARDS**

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens); 2021.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete; 2020.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

**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. 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. Copies of specified test methods.
  - 4. Recommendations for remediation of unsatisfactory surfaces.
  - 5. Submit report to Architect.
  - 6. Submit report not more than two business days after conclusion of testing.
- C. Adhesive Bond and Compatibility Test Report.

**1.05 QUALITY ASSURANCE**

- A. 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**

### **2.01 MATERIALS**

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
  - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
  - 2. Latex or polyvinyl acetate additions are permitted; gypsum content is prohibited.
  - 3. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
  - 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.

## **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. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.



3. Specified remediation, if required.
4. Patching, smoothing, and leveling, as required.
5. Other preparation specified.
6. Adhesive bond and compatibility test.
7. 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 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.

**3.04 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.

**3.05 ADHESIVE BOND AND COMPATIBILITY TESTING**

- A. Comply with requirements and recommendations of floor covering manufacturer.

**3.06 APPLICATION OF REMEDIAL FLOOR COATING**

- A. Comply with requirements and recommendations of coating manufacturer.

**3.07 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. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016, with Supplement (2020).
- B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 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 A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- F. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2020.
- G. 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.
- H. 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.
- I. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.
- J. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.
- K. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2018.
- L. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing; 2018.
- M. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.
- N. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2019, with Editorial Revision (2020).
- O. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.
- P. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023c.
- Q. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.
- R. ASTM E413 - Classification for Rating Sound Insulation; 2022.
- S. GA-216 - Application and Finishing of Gypsum Panel Products; 2021.

- T. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- U. UL (FRD) - Fire Resistance Directory; Current Edition.

### 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.
- B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
  - 1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire-Resistance-Rated Assemblies: Provide completed assemblies with the following characteristics:
  - 1. Fire-Resistance-Rated Partitions: As indicated on the plans.
  - 2. Head of Fire-Resistance-Rated Partitions: As indicated on the plans.
  - 3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

### 2.02 METAL FRAMING MATERIALS

- A. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and screwed to secondary deflection channel set inside but unattached to top track.
- B. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection and prevent rotation of studs while maintaining structural performance of partition.
  - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100.
  - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot-dipped galvanized coating.
  - 3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
- C. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.
- D. Non-structural Framing Accessories:

1. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
    - a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
    - b. Height: 23-3/4 inches (603 mm).
    - c. Products:
      - 1) ClarkDietrich; Pony Wall (PW): [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
  2. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
- E. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.

### 2.03 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. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
  4. Thickness:
    - a. Vertical Surfaces: 5/8 inch (16 mm) Type X.
    - b. Ceilings: 5/8 inch (16 mm) Type X.
- C. Backing Board For Wet Areas:
1. Application: Horizontal surfaces behind tile in wet areas including countertops.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
    - a. Fire-Resistance-Rated Type: Type X core, thickness 5/8 inch (16 mm).
- D. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
1. Application: Vertical surfaces behind thinset tile, except in wet areas.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. Type X Thickness: 5/8 inch (16 mm).
  4. Edges: Tapered.
- E. Acoustical Sound Dampening Wall and Ceiling Board: Two layers of heavy paper-faced, high-density gypsum board separated by a viscoelastic polymer layer and capable of achieving STC rating of 50 or more in typical stud wall assemblies as calculated in accordance with ASTM E413 and when tested in accordance with ASTM E90.
1. Type X Thickness: 5/8 inch (16 mm).
  2. Long Edges: Tapered.
  3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
- F. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
1. Application: Exterior sheathing, unless otherwise indicated.
  2. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.

3. Core Type: Regular.
  4. Regular Board Thickness: 1/2 inch (13 mm).
  5. Edges: Square.
- G. 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 and soffits 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.

#### **2.04 GYPSUM BOARD ACCESSORIES**

- A. Sound Isolation Tape: Elastomeric foam tape for sound decoupling.
1. Surface Burning Characteristics: Provide assemblies with flame spread index of 75 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
  2. Tape Thickness: 1/4 inch (6 mm).
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- C. Water-Resistive Barrier: See Section 07 25 00.
- D. 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.
- E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches (0.84 mm) in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch (0.84 to 2.84 mm) in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

#### **3.02 ACOUSTIC ACCESSORIES INSTALLATION**

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.
- C. Acoustic Sealant: Install in accordance with manufacturer's instructions.
1. Place two beads continuously on substrate before installation of perimeter framing (track) members.
  2. Place continuous bead at perimeter of each layer of gypsum board.
  3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.
    - a. Provide fire rated acoustical sealant in all rated walls in strict compliance with requirements of assembly listing.

#### **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. Double-Layer, Nonrated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
  - 1. Seal joints, cut edges, and holes with water-resistant sealant.
  - 2. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.
- F. 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.
- G. Cementitious Backing Board: Install over steel framing members where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
- H. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.

#### **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 5: Walls and ceilings to receive, egg-shell, semi-gloss or gloss paint finish and other areas specifically indicated.
  - 2. Level 4: Walls and ceilings to receive flat paint finish or wall coverings, unless otherwise indicated.
  - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  - 4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- 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. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
- E. 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 22 16  
NON-STRUCTURAL METAL FRAMING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Metal partition framing.
- B. Framing accessories.

**1.02 REFERENCE STANDARDS**

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2016, with Supplement (2020).
- B. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing; 2020.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 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 A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- F. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories; 2020.
- G. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.
- H. 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.
- I. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2023.
- J. ASTM E413 - Classification for Rating Sound Insulation; 2022.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings:
  - 1. Indicate component details, stud layout, framed openings, anchorage to structure, type and location of fasteners, accessories, and items of other related work.
  - 2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.
- C. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.
- D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

**1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

**1.05 DELIVERY, STORAGE AND HANDLING**

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI's "Code of Standard Practice".

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Metal Framing, Connectors, and Accessories:
  - 1. ClarkDietrich Building Systems: [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
  - 2. MarinoWARE; \_\_\_\_: [www.marinoware.com/#sle](http://www.marinoware.com/#sle).
  - 3. The Steel Network, Inc: [www.SteelNetwork.com/#sle](http://www.SteelNetwork.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 FRAMING MATERIALS**

- A. Fire Rated Assemblies: Comply with applicable code and as indicated on drawings.
- B. Non-Loadbearing Framing System Components: AISI S220; sheet steel, of size and properties necessary for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf (L/240 at 240 Pa).
  - 1. Studs: C-shaped with flat faces.
  - 2. Runners: U-shaped, sized to match studs.
  - 3. Ceiling Channels: C-shaped.
  - 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch (22 mm).
  - 5. Resilient Furring Channels: Single leg configuration; 1/2 inch (12 mm) channel depth.
    - a. Products:
      - 1) ClarkDietrich; RC Deluxe Resilient Channel: [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
- C. Partition Head to Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and braced with continuous bridging on both sides.
- D. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws, and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
  - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code when evaluated in accordance with AISI S100.
  - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50.
  - 3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
- E. Non-Loadbearing Framing Accessories:
  - 1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
  - 2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
    - a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
    - b. Height: 23-3/4 inches (603 mm) and 35-3/4 inches (908 mm).
    - c. Products:
      - 1) ClarkDietrich; Pony Wall (PW): [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
      - 2) Substitutions: See Section 01 60 00 - Product Requirements.
  - 3. Framing Connectors: ASTM A653/A653M steel clips; secures cold rolled channel to wall studs for lateral bracing.
  - 4. Sheet Metal Backing: 0.0395 inch (1.01 mm) thick.
  - 5. Fasteners: ASTM C1002 self-piercing self-tapping screws.
  - 6. Anchorage Devices: Powder actuated.

**2.03 FABRICATION**

- A. Fabricate assemblies of framed sections to sizes and profiles required.
- B. Fit, reinforce, and brace framing members to suit design requirements.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that rough-in utilities are in proper location.

**3.02 INSTALLATION OF STUD FRAMING**

- A. Comply with requirements of ASTM C1007.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
- E. Extend partition framing as indicated on drawings.
- F. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs as indicated.
- G. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- H. Align and secure top and bottom runners at 24 inches (600 mm) on center.
- I. At partitions indicated with an acoustic rating:
  - 1. Provide components and install as required to produce STC ratings as indicated, based on published tests by manufacturer conducted in accordance with ASTM E90 with STC rating calculated in accordance with ASTM E413.
- J. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
- K. Install studs vertically at 16 inches (400 mm) on center.
- L. Align stud web openings horizontally.
- M. Secure studs to tracks using fastener method. Do not weld.
- N. Stud splicing is not permissible.
- O. Fabricate corners using a minimum of three studs.
- P. Install double studs at wall openings, door and window jambs, not more than 2 inches (50 mm) from each side of openings.
- Q. Brace stud framing system rigid.
- R. Coordinate erection of studs with requirements of door frames and window frames; install supports and attachments.
- S. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.
- T. Blocking: Use wood blocking secured to studs. Provide blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and opening frames.
- U. Furring: Install at spacing and locations shown on drawings. Lap splices a minimum of 6 inches (150 mm).

**3.03 CEILING AND SOFFIT FRAMING**

- A. Comply with requirements of ASTM C754.
- B. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- C. Install furring independent of walls, columns, and above-ceiling work.

- D. Securely anchor hangers to structural members or embed them in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.
- E. Space main carrying channels at maximum 72 inches (1 800 mm) on center, and not more than 6 inches (150 mm) from wall surfaces. Lap splice securely.
- F. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- G. Place furring channels perpendicular to carrying channels, not more than 2 inches (50 mm) from perimeter walls, and rigidly secure. Lap splices securely.

**3.04 TOLERANCES**

- A. Maximum Variation From True Position: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation From Plumb: 1/8 inch in 10 feet (3 mm in 3 m).

**END OF SECTION**

**SECTION 09 30 00  
TILING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Ceramic trim.
- D. Non-ceramic trim.

**1.02 REFERENCE STANDARDS**

- A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2018.
- B. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2021.
- C. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2019.
- D. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2019.
- E. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2014 (Reaffirmed 2019).
- F. ANSI A118.11 - American National Standard Specifications for EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar; 2017.
- G. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation; 2014 (Reaffirmed 2019).
- H. ANSI A136.1 - American National Standard Specifications for Organic Adhesives for Installation of Ceramic Tile; 2020.
- I. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.
- J. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products; 2018 (Reapproved 2023).
- K. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2023.

**1.03 ADMINISTRATIVE REQUIREMENTS**

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

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, thresholds, ceramic accessories, and setting details.
- D. Selection Samples: Color charts illustrating full range of colors and patterns.
- E. Approval Samples: Samples of actual tiles for selection.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications:
  - 1. Company specializing in performing tile installation, with minimum of five years of documented experience.
- C. Single Source Responsibility: Obtain each type and color of tile from a single source. Obtain each type and color of mortar, adhesive and grout from the same source.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.
- B. Deliver and store products in manufacturer's unopened packaging until ready for installation.
- C. Store tile and setting materials on elevated platforms, under cover and in a dry location and protect from contamination, dampness, freezing or overheating.

**1.07 FIELD CONDITIONS**

- A. Do not install solvent-based products in an unventilated environment.
- B. Maintain ambient and substrate temperature above 50 degrees F (10 degrees C) and below 100 degrees F (38 degrees C) during installation and curing of setting materials.

**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. Tile and Trim Units: Furnish quantity of full-size units equal to three (3) percent for each type, composition, color, pattern, size and shape installed.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Tilebar: [www.tilebar.com/#sle](http://www.tilebar.com/#sle). B.O.D.
- B. Dal-Tile Corporation: [www.daltile.com/#sle](http://www.daltile.com/#sle).
- C. Emser Tile, LLC: [www.emser.com/#sle](http://www.emser.com/#sle).
- D. Summitville Tiles, Inc: [www.summitville.com](http://www.summitville.com).
- E. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Glazed Wall Tile, Type WT-1, WT-2 AND WT-3: ANSI A137.1 standard grade.
  - 1. Moisture Absorption: 7.0 to 20.0 percent as tested in accordance with ASTM C373.
  - 2. Edges: Cushioned.
  - 3. Surface Finish: High gloss.
  - 4. Color(s): To be selected by Architect from manufacturer's full range including accent colors.
    - a. Colors for WT-1, WT-2, and WT-3 to be different.
    - b. Allow for three colors as selected by Architect from manufacturer's full range for each WT-1, WT-2, and WT-3.
  - 5. Trim Units: Matching bullnose shapes in sizes coordinated with field tile.
  - 6. Products:
    - a. Tilebar: [www.tilebar.com/#sle](http://www.tilebar.com/#sle).
      - 1) Basis of Design or approved substitution.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Porcelain Tile, Type \_\_\_\_\_: ANSI A137.1 standard grade.
  - 1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
  - 2. Size: 3 x 6 Chevron Mosaic.
    - a. Pattern: Vertical

3. Thickness: 5/16 inch (8 mm).
  4. Edges: Square.
  5. Surface Finish: Polished.
  6. Color(s): To be selected by Architect from manufacturer's full range.
    - a. Allow for three colors as selected by Architect from manufacturer's full range.
  7. Products:
    - a. Tilebar: [www.tilebar.com/#sle](http://www.tilebar.com/#sle).
      - 1) Basis of Design or approved substitution.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- H. Natural Stone Tile, Type FT-1, FT-2:
1. Edges: Square.
  2. Moisture Absorption: 0 to 0.3 percent, maximum.
  3. Products:
    - a. Tilebar; \_\_\_\_\_: [www.tilebar.com/#sle](http://www.tilebar.com/#sle).

## 2.02 TRIM AND ACCESSORIES

- A. Trim: Matching bullnose shapes in sizes coordinated with field tile.
1. Applications:
    - a. Open Edges: Bullnose.
    - b. Inside Corners: Jointed.
  2. Manufacturers: Same as for tile.
- B. Non-Ceramic Trim - Walls: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
1. Applications:
    - a. Open edges of wall and floor tile.
    - b. Wall corners, outside.
    - c. Borders and other trim as indicated on drawings.
  2. Products:
    - a. Schluter-Systems; Schiene: [www.schluter.com/#sle](http://www.schluter.com/#sle).
      - 1) Product: Schluter Quadec Basis of Design or approved substitution.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Non-Ceramic Trim - Floors: Brushed stainless steel, style and dimensions to suit application.
1. "L" shaped profile: 1/8 inch (3.2 mm) wide visible surface integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
    - a. Manufacturers:
      - 1) Schluter-Systems: [www.schluter.com/#sle](http://www.schluter.com/#sle).
        - (a) Product: Schluter SCHIENE Basis of Design or approved substitution.
      - 2) Genesis APS International: [www.genesis-aps.com/#sle](http://www.genesis-aps.com/#sle).
      - 3) Dural USA, Inc.: [www.dural.de](http://www.dural.de).
      - 4) Substitutions: See Section 01 60 00 - Product Requirements.
  2. Sloped profile: Sloped exposed surface, vertical leading edge, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
    - a. Manufacturers:
      - 1) Schluter-Systems: [www.schluter.com/#sle](http://www.schluter.com/#sle).
        - (a) Product: Schluter RENO-U Basis of Design or approved substitution.
      - 2) Genesis APS International: [www.genesis-aps.com/#sle](http://www.genesis-aps.com/#sle).
      - 3) Substitutions: See Section 01 60 00 - Product Requirements.

## 2.03 SETTING MATERIALS

- A. Provide setting and grout materials from same manufacturer.
- B. Manufacturers:
1. ARDEX Engineered Cements: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
  2. Bostik Inc: [www.bostik-us.com/#sle](http://www.bostik-us.com/#sle).

3. Custom Building Products: [www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).
4. LATICRETE International, Inc: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
5. Substitutions: See Section 01 60 00 - Product Requirements.

C. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.

## 2.04 GROUTS

A. Provide setting and grout materials from same manufacturer.

B. Manufacturers:

1. ARDEX Engineered Cements: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
2. Bostik Inc; \_\_\_\_\_: [www.bostik-us.com/#sle](http://www.bostik-us.com/#sle).
3. Custom Building Products: [www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).
4. LATICRETE International, Inc; \_\_\_\_\_: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
5. Substitutions: See Section 01 60 00 - Product Requirements.

C. Standard Grout: ANSI A118.6 standard cement grout.

1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
2. Use sanded grout for joints 1/8 inch (3.2 mm) wide and larger; use unsanded grout for joints less than 1/8 inch (3.2 mm) wide.
3. Color(s): As selected by Architect from manufacturer's full line.

D. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.

1. Applications: All floor locations.
2. Color(s): As selected by Architect from manufacturer's full line.
3. Products:
  - a. ARDEX Engineered Cements; ARDEX WA: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
  - b. Custom Building Products; CEG-IG 100% Solids Industrial Grade Epoxy Grout: [www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).
  - c. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
  - d. Merkrete, by Parex USA, Inc; Merkrete Pro Epoxy: [www.merkrete.com/#sle](http://www.merkrete.com/#sle).
  - e. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.05 MAINTENANCE MATERIALS

A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.

1. Applications: Between tile and plumbing fixtures.
2. Color(s): As selected by Architect from manufacturer's full line.
3. Products:
  - a. ARDEX Engineered Cements; ARDEX SX: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
  - b. Custom Building Products; Commercial 100% Silicone Caulk: [www.custombuildingproducts.com/#sle](http://www.custombuildingproducts.com/#sle).
  - c. LATICRETE International, Inc; LATICRETE LATASIL: [www.laticrete.com/#sle](http://www.laticrete.com/#sle).
  - d. Merkrete, by Parex USA, Inc; Merkrete Colored Caulking: [www.merkrete.com/#sle](http://www.merkrete.com/#sle).
  - e. Substitutions: See Section 01 60 00 - Product Requirements.

B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.

1. Composition: Water-based colorless silicone.

## 2.06 ACCESSORY MATERIALS

A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.

1. Crack Resistance: No failure at 1/8 inch (3.2 mm) gap, minimum.



**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

**3.02 PREPARATION**

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.
- E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

**3.03 INSTALLATION - GENERAL**

- A. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- B. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- C. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- D. Form internal angles square and external angles bullnosed.
- E. Install non-ceramic trim in accordance with manufacturer's instructions.
- F. Install thresholds where indicated.
- G. Sound tile after setting. Replace hollow sounding units.
- H. Keep control and expansion joints free of mortar, grout, and adhesive.
- I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

**3.04 INSTALLATION - FLOORS - THIN-SET METHODS**

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
  - 1. Where waterproofing membrane is indicated, install in accordance with TCNA (HB) Method F122, with latex-Portland cement grout.

**3.05 INSTALLATION - WALL TILE**

- A. Over coated glass mat backer board on studs, install in accordance with TCNA (HB) Method W245.

**3.06 CLEANING**

- A. Clean tile and grout surfaces.

**3.07 PROTECTION**

- A. Do not permit traffic over finished floor surface for 4 days after installation.

**END OF SECTION**

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**SECTION 09 51 00  
ACOUSTICAL CEILINGS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

**1.02 REFERENCE STANDARDS**

- A. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.
- C. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2023.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning and junctions with other ceiling finishes.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit two full size samples illustrating material and finish of acoustical units.
- E. Samples: Submit two samples each, 12 inches (300 mm) long, of suspension system main runner, cross runner, and perimeter molding.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

**1.05 QUALITY ASSURANCE**

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

**1.06 FIELD CONDITIONS**

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

**1.07 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. Acoustical Ceiling Units: Furnish quantity of full-size units equal to five (5) percent of amount installed.
  - 2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to two (2) percent of amount installed.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Acoustic Tiles/Panels:
  - 1. Armstrong World Industries, Inc: [www.armstrongceilings.com/#sle](http://www.armstrongceilings.com/#sle).
  - 2. CertainTeed Corporation: [www.certainteed.com/ceilings-and-walls/#sle](http://www.certainteed.com/ceilings-and-walls/#sle).
  - 3. USG Corporation: [www.usg.com/#sle](http://www.usg.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Suspension Systems:
  - 1. Same as for acoustical units.

**2.02 ACOUSTICAL UNITS**

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. Acoustical Panels, Type ACT-1: Painted mineral fiber, with the following characteristics:
  - 1. Classification: ASTM E1264 Type III.
  - 2. Size: 24 by 24 inches (610 by 610 mm).
  - 3. Thickness: 3/4 inch (19 mm).
  - 4. Tile Edge: Angled tegular.
  - 5. Color: White.
  - 6. Suspension System: Exposed grid.
  - 7. Product:
    - a. USG Corporation; Millenia Acoustical Panels: [www.usg.com/ceilings/#sle](http://www.usg.com/ceilings/#sle).
      - 1) Product: 76705 Basis of Design or approved substitution.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Acoustical Panels, Type ACT-2: Mineral fiber with membrane-faced overlay, with the following characteristics:
  - 1. Classification: ASTM E1264 Type IV.
  - 2. Size: 24 by 24 inches (610 by 610 mm).
  - 3. Panel Edge: SLT.
  - 4. Color: White.
  - 5. Suspension System: Exposed grid.
  - 6. Products:
    - a. USG Corporation; Mars Acoustical Panels: [www.usg.com/ceilings/#sle](http://www.usg.com/ceilings/#sle).
      - 1) Product: 88138 Basis of Design or approved substitution.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.

**2.03 SUSPENSION SYSTEM(S)**

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
- B. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
- C. Exposed Suspension System: Hot-dipped galvanized steel grid with aluminum cap.
  - 1. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
  - 2. Profile: Tee; 15/16 inch (24 mm) face width.
  - 3. Finish: Baked enamel.
  - 4. Color: White.

**2.04 ACCESSORIES**

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch (2 mm) galvanized steel wire.
- C. Hold-Down Clips: Manufacturer's standard clips to suit application.

- D. Perimeter Moldings: Same metal and finish as grid.
  - 1. Size: As required for installation conditions and specified Seismic Design Category.
  - 2. Angle Molding: L-shaped, for mounting at same elevation as face of grid.
- E. Touch-up Paint: Type and color to match acoustical and grid units.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

#### **3.02 PREPARATION**

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.

#### **3.03 INSTALLATION - SUSPENSION SYSTEM**

- A. Install suspension system in accordance with ASTM C636/C636M and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected ceiling plan.
  - 1. Where no reflected ceiling plan is indicated; layout system to a balanced grid design with no edge units smaller than 4 inches (100 mm), unless directed otherwise by Architect.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
  - 1. Use longest practical lengths.
- E. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.
- J. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch (25 mm) movement. Maintain visual closure.

#### **3.04 INSTALLATION - ACOUSTICAL UNITS**

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units with pattern parallel to longest room axis.
- D. Fit border trim neatly against abutting surfaces.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
  - 1. Cut to fit irregular grid and perimeter edge trim.
  - 2. Make field cut edges of same profile as factory edges.
  - 3. Double cut and field paint exposed reveal edges.
- G. Where round obstructions occur, provide preformed closures to match perimeter molding.

H. Install hold-down clips on panels within 20 ft (6 m) of an exterior door.

**3.05 TOLERANCES**

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

**END OF SECTION**

**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; 2022.
- C. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile; 2004 (Reapproved 2018).
- D. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.
- E. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2018.

**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 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.
- C. Single-Source Responsibility: Obtain types of flooring and accessories and adhesive from a single manufacturer.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- D. Protect roll materials from damage by storing on end.
- E. Do not double stack pallets.

**1.06 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.

**1.07 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. Vinyl Composition Tile- Type VCT: Homogeneous, with color extending throughout thickness.
  - 1. Manufacturers:
    - a. Armstrong Flooring, Inc: [www.armstrongflooring.com/#sle](http://www.armstrongflooring.com/#sle).
    - b. Johnsonite, a Tarkett Company: [www.johnsonite.com](http://www.johnsonite.com).
    - c. Congoleum: [www.congoleum.com](http://www.congoleum.com).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
  - 3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
  - 4. Size: 12 by 12 inch (305 by 305 mm).
  - 5. Thickness: 0.125 inch (3.2 mm).
  - 6. Surface Finish Pattern: Marbleized.
  - 7. Color: As indicated.
    - a. VCT-1: As selected by Architect from manufacturer's full range.
      - 1) Allow for three colors as selected by Architect from manufacturer's full range for VCT-1.
  - 8. Product: Armstrong Standard Excelon Imperial Texture Basis of Design or approved substitution.

**2.02 RESILIENT BASE****2.03 ACCESSORIES**

- A. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- B. Moldings, Transition and Edge Strips: Same material as flooring.
  - 1. Provide transition/reducing strips tapered to meet abutting materials.
- C. Filler for Coved Base: Plastic.
- D. Sealer and Wax: 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. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for alkalinity (pH).
  - 1. 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. Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI (RWP).
- B. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.
- C. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- D. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- E. Clean substrate.
- F. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.
- 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. Install multi-color accent tile in pattern as indicated on floor finish plan.
  - 1. 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 basket weave 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, 'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use manufacturer's premolded units.
- C. 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 MAINTENANCE - FLOORING**

- A. Machine scrub the floor with a properly diluted neutral detergent solution and a scrubbing pad or equivalent brushes.
  - 1. Do not use aggressive mop-on/mop-off, no-scrub and no-rinse strippers.
- B. Thoroughly rinse the entire floor with fresh, clean water. Remove rinse water and allow the floor to dry completely.
- C. Apply 5 coats of high-quality commercial floor polish.

**3.08 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 65 10  
RESILIENT BASE AND ACCESSORIES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Resilient base.
- B. Installation accessories.

**1.02 REFERENCE STANDARDS**

- A. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.

**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. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F (13 degrees C) and 90 degrees F (72 degrees C).
- D. Protect materials from damage by storing per manufacturer's recommendations.

**1.06 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).

**1.07 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. 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 RESILIENT BASE**

- A. Resilient Base- Type RB: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Style B, Cove.
  - 1. Manufacturers:
    - a. Burke Flooring: [www.burkeflooring.com/#sle](http://www.burkeflooring.com/#sle).
    - b. Johnsonite, a Tarkett Company: [www.johnsonite.com](http://www.johnsonite.com).
    - c. Roppe Corp: [www.roppe.com](http://www.roppe.com).

- d. Flexco: [www.flexco.com](http://www.flexco.com).
- e. 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.

## **2.02 ACCESSORIES**

- A. Primers and Adhesives: Waterproof; types recommended by manufacturer.
- B. Moldings, Transition and Edge Strips: Same material as flooring.
  - 1. Provide transition/reducing strips tapered to meet abutting materials.
- C. Filler for Coved Base: Plastic.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. 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.
- B. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.
- C. 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 substrates as recommended by base and adhesive manufacturer.
- B. Clean substrate.

### **3.03 INSTALLATION - GENERAL**

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in strict accordance with manufacturer's instructions.

### **3.04 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.
- E. Scribe and fit to door frames and other interruptions.

### **3.05 CLEANING**

- A. Remove excess adhesive from base and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

**END OF SECTION**

**SECTION 09 65 19  
RESILIENT TILE FLOORING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Resilient tile flooring.
- B. Installation accessories:
  - 1. Adhesives.
  - 2. Finishes and cleaners.

**1.02 REFERENCE STANDARDS**

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens); 2021.
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).
- C. ASTM E662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials; 2021a, with Editorial Revision.
- D. ASTM F137 - Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus; 2008 (Reapproved 2013).
- E. ASTM F386 - Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces; 2017 (Reapproved 2022).
- F. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2022.
- G. ASTM F925 - Standard Test Method for Resistance to Chemicals of Resilient Flooring; 2013 (Reapproved 2020).
- H. ASTM F970 - Standard Test Method for Measuring Recovery Properties of Floor Coverings after Static Loading; 2022.
- I. ASTM F1514 - Standard Test Method for Measuring Heat Stability of Resilient Flooring by Color Change; 2003 (Reapproved 2013).
- J. ASTM F1515 - Standard Test Method for Measuring Light Stability of Resilient Flooring by Color Change; 2003 (Reapproved 2008).
- K. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2020.
- L. ASTM F1914 - Standard Test Method for Short-Term Indentation and Residual Indentation of Resilient Floor Covering; 2007 (Reapproved 2011).
- M. ASTM F2055 - Standard Test Method for Size and Squareness of Resilient Floor Tile by Dial Gauge Method; 2017 (Reapproved 2021).
- N. ASTM F2199 - Standard Test Method for Determining Dimensional Stability of Resilient Floor Tile after Exposure to Heat; 2009 (Reapproved 2014).
- O. ASTM F2421 - Standard Test Method for Measurement of Resilient Floor Plank by Dial Gage; 2005 (Reapproved 2011).
- P. 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. Shop Drawings.
- C. Manufacturer's documentation for flooring and accessories:
  - 1. Technical Data.
  - 2. Installation and Maintenance.
  - 3. Warranty.

- D. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- E. Verification Samples: Submit two samples, full size illustrating color and pattern for each resilient flooring product specified.

#### **1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and that the material is of the correct style, color, quantity and run number(s).
- B. Store all materials flat and off of the floor in an acclimatized, weather-tight space between 65 to 85 degrees F (18 to 29 degrees C).

#### **1.05 FIELD CONDITIONS**

- A. Acclimate material at jobsite between 65 to 85 degrees F (18 to 29 degrees C) and 35 percent to 85 percent relative humidity for 48 hours prior to installation. Temperature and relative humidity should also be maintained at the same levels during installation, and after installation.
- B. Spread unopened cartons no more than 6 cartons high and at least 4 inches (101 mm) apart.
- C. Keep away from heating and cooling ducts and direct sunlight.
- D. Close areas to traffic during installation of flooring and accessories.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.
- B. Installer Qualifications: Installer experienced in performing work of this section with not less than three years of documented experience.

#### **1.07 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. 10-Year Commercial Material Warranty.

#### **1.08 MAINTENANCE MATERIALS**

- A. Extra Materials: Deliver extra materials to the Owner. Furnish extra materials from the same production run as products installed.
  - 1. Package with protective covering for storage and identified with appropriate labels.
  - 2. 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 MANUFACTURERS**

- A. Mohawk Group: [www.mohawkgroup.com](http://www.mohawkgroup.com).
- B. Shaw Contract Group: [www.shawcontract.com](http://www.shawcontract.com).
- C. Armstrong Flooring Inc.: [www.armstrongflooring.com](http://www.armstrongflooring.com).
- D. Substitutions: See Section 01 60 00 - Product Requirements.

#### **2.02 RESILIENT TILE FLOORING**

- A. Luxury Vinyl Plank and Tile:
  - 1. Physical Properties:
    - a. Construction: Layered.
    - b. Wear Layer Thickness: 20 mil (0.5mm).
    - c. Total Thickness: 2.5mm.
    - d. Finish: Ultra Enhanced Urethane.
  - 2. Manufacturing, Performance, and Safety Standards:
    - a. ASTM F1700, Classification: Class III, Type A - Smooth, Type B - Embossed.
    - b. ASTM F386, Thickness: Passes requirements.

- c. ASTM F2055, Size and Squareness: Passes requirements.
  - d. ASTM F1914, Residual Indentation: Surpasses requirements.
  - e. ASTM F137, Flexibility: Surpasses requirements.
  - f. ASTM F2199, Dimensional Stability: Surpasses requirements.
  - g. ASTM F925, Chemical Resistance: Surpasses requirements.
  - h. ASTM F1514, Resistance to Heat: Surpasses requirements.
  - i. ASTM F1515, Resistance to Light: Surpasses requirements.
  - j. ASTM E648/NFPA 253, Critical Radiant Flux: Class I.
  - k. ASTM E662, Smoke Density (Flaming and Non-Flaming): Passes requirements.
  - l. ASTM F970, Static Load Limit: Greater than or equal to 1,000 pounds (surpasses requirements).
3. Color: As selected by Architect from manufacturer's full range.
    - a. Allow for three colors as selected by Architect from manufacturer's full range for LVT-1.
  4. Installation Pattern: As selected by Architect from manufacturer's full range.
  5. Product: Living Local Stonework by Mohawk Group Basis of Design or approved substitution.

### 2.03 ACCESSORIES

- A. Moldings, Transition and Edge Strips: Same material as flooring.
- B. Adhesives: As recommended by manufacturer.
- C. Finishes and Cleaners: As recommended by manufacturer.

## PART 3 EXECUTION

### 3.01 EXAMINATION .

- A. Install flooring and accessories after other operations (including painting) have been completed.
- B. Acceptance of Conditions: Carefully examine all installation areas with installer/applicator present, for compliance with requirements affecting work performance.
  1. Verify that field measurements, product, adhesives, substrates, surfaces, structural support, tolerances, levelness, temperature, humidity, moisture content level, pH, cleanliness and other conditions are as required by the manufacturer, and ready to receive work.
- C. Verify that substrate is contaminant-free, including old adhesives and abatement chemicals.
- D. Test substrates as required by manufacturer to verify proper conditions exist.
  1. Concrete:
    - a. Check for concrete additives such as fly ash, curing compounds, hardeners, or other surface treatments that may prevent proper bonding of floor coverings.
    - b. Perform alkalinity testing per ASTM F710 to verify pH level is between 7 to 10.
    - c. Check substrate for absorbency per manufacturer's recommendations.
    - d. Perform bond testing per ASTM F710 to determine compatibility of adhesive to concrete substrate.
- E. Verify that required floor-mounted utilities are in correct location.

### 3.02 PREPARATION

- A. Flooring installation should not begin until all site conditions have been assessed, testing has been completed and subfloor conditions have been approved.
- B. Prepare per manufacturer's written instructions, Section 01 7000, and as follows:
  1. Prepare substrates to ensure proper adhesion of Luxury Vinyl Plank & Tile.
  2. Concrete Substrates: Prepare substrate per ASTM F710.
    - a. Verify that subfloor is clean, flat, smooth, free of dirt, rust, paint, oil, wax or any contaminant that will interfere with adhesive bonding.
    - b. Mechanically remove substrate coatings that are not compatible with adhesives, such as sealers, curing, hardening or parting compounds, soap, wax, oil, etc.
      - 1) Do not use solvents or adhesive removers.
    - c. Expansion joints, isolation joints, or other moving joints must be honored and must not be filled with underlayment products or other materials, and floor coverings must not be laid

over them. Expansion joint covering systems should be detailed by the architect or engineer, and based upon intended usage and aesthetic considerations.

- d. Surface cracks, grooves, depressions, control joints or other non-moving joints, and other irregularities shall be filled or smoothed with high-quality Portland cement or calcium aluminate based patching or underlayment compound for filling or smoothing, or both.
  - 1) Do not skim-coat large areas with patching compound, especially slick power-troweled surfaces.
  - 2) Sand smooth per manufacturer's instructions.
- e. Slick surfaces such as power-troweled concrete shall be profiled as needed to allow for a mechanical bond between the adhesive and subfloor.
- f. Do not use gypsum-based underlayment products and do not skim coat concrete subfloors.
- g. Self-Leveling Underlayments: Provide a dry and smoothly-sanded underlayment substrate ready for installation of Luxury Vinyl Plank & Tile. Underlayment compound shall be moisture-resistant, mildew-resistant, and alkali-resistant and must have a minimum of 3,000 psi compressive strength per ASTM C109/C109M.
- h. Lightweight concrete shall have a compressive strength greater than 90 pounds per cubic foot with minimum compression strength of 2,500 psi or greater.

### 3.03 INSTALLATION

- A. Installation per manufacturer's written instructions, Section 01 7000, and as follows:
  1. Layout shall be specified by Architect.
  2. Follow layout and ensure installation reference lines are square.
  3. Field tiles shall be installed with directional arrows on back aligned in the same direction, or may be installed in quarter-turned fashion.
  4. Check cartons for and do not mix dye lots.
  5. Adhesives: Adhere flooring to substrate using the full spread method resulting in a completed installation without gaps, voids, raised edges, bubbles or any other surface imperfections.
    - a. Select appropriate adhesive, trowel and follow manufacturer's instructions.
    - b. Periodically spot-check transfer of adhesive to back of tile during installation.
    - c. Roll floor with a 100 pound roller to ensure proper transfer of adhesive and bonding.
    - d. Protect floor from traffic per manufacturer's instructions.
    - e. Do not wet mop floor until the adhesive has properly set per written instructions.

### 3.04 CLEANING

- A. Waste Management per Section 01 7000 and Section 01 7419, and as follows:
  1. Coordinate material reclamation program with manufacturer, if applicable.
    - a. Store and return cartons and pallets to manufacturer or recycler for reuse or recycling.
- B. Provide progress cleaning per manufacturer's written instructions, Section 01 7000, and as follows:
  1. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the work.
    - a. Clean and protect completed construction until Date of Substantial Completion.
    - b. During installation, remove wet adhesive from surface of flooring per manufacturer's instructions.
  2. Site: Maintain project site free of waste materials and debris.
- C. Provide final cleaning immediately prior to Date of Substantial Completion inspection per manufacturer's written instructions and Section 01 7000.
  1. Protection: Remove manufacturer's and other installed protection immediately prior to Date of Substantial Completion inspection, unless required otherwise.
  2. Clean floor with a neutral 6-8 pH cleaner.

### 3.05 MAINTENANCE

- A. Initial maintenance per flooring manufacturer's written instructions and as follows:
  1. Allow the adhesive to cure for at least 48 hours prior to wet cleaning the floor.



2. Sweep, dust mop or vacuum the floor thoroughly to remove all loose dirt, dust, grit and debris. Do not use vacuums with a beater bar assembly.
3. Remove any dried adhesive residue from the surface with mineral spirits applied to a clean, lint-free cloth.
4. Damp mop the floor using a cleaner recommended by the flooring manufacturer.
5. If necessary, scrub the floor using an auto scrubber or rotary machine (300 rpm or less) with a cleaner recommended by the flooring manufacturer. Maintain the proper dilution ratio and use the appropriate scrubbing brush or pad.
6. Thoroughly rinse the entire floor with fresh, clean water. Remove the dirty residue with a wet-vacuum or clean mop and allow the floor to dry completely.

### **3.06 PROTECTION**

- A. Protect materials from construction operations until Date of Substantial Completion or Owner occupancy, whichever occurs first.
  1. Protect finished floor from abuse and damage by using heavy non-staining kraft paper, drop cloths or equivalent. Use additional, non-damaging protective materials as needed.
  2. Light foot traffic on a newly installed floor can be permitted after 24 hours.
  3. Keep heavy traffic and rolling loads off the newly installed LVT flooring for 48 hours.
  4. Protect the floor from rolling loads by covering with protective boards.

**END OF SECTION**

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Division 09

New Facility For  
North Granville County Senior Center

**SECTION 09 65 66  
RESILIENT ATHLETIC FLOORING**

**PART 2 PRODUCTS**

**END OF SECTION**

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**SECTION 09 68 13  
TILE CARPETING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Carpet tile, fully adhered.

**1.02 REFERENCE STANDARDS**

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2016 (Reapproved 2021).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).
- C. CRI (GLP) - Green Label Plus Testing Program - Certified Products; Current Edition.
- D. 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; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Submit two, 12 inch (300 mm) long samples of edge strip and base cap.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- F. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

**1.05 FIELD CONDITIONS**

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

**1.06 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. Carpet Tile: Furnish quantity of full-size units equal to five (5) percent for each type, color, pattern and size installed.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Shaw Contract Group: [www.shawcontractgroup.com](http://www.shawcontractgroup.com).
- B. Interface, Inc: [www.interface.com/#sle](http://www.interface.com/#sle).
- C. Milliken & Company: [www.milliken.com/#sle](http://www.milliken.com/#sle).
- D. Mohawk Group: [www.mohawkgroup.com/#sle](http://www.mohawkgroup.com/#sle).
  - 1. Basis of Design or approved substitution.
- E. Patcraft: [www.patcraft.com](http://www.patcraft.com).
- F. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 MATERIALS**

- A. Tile Carpeting, Type CPT-1: Tufted, manufactured in one color dye lot.
  - 1. Product: Art Exposure Collection manufactured by Mohawk or approved substitution.
    - a. CPT-1: Adaptable.
      - 1) Color: As selected by Architect from manufacturer's full range.
      - 2) Installation Pattern: Quarter turn.
      - 3) Allow for three colors as selected by Architect from manufacturer's full range for CPT-1.
  - 2. Tile Size: 24x24 inch (600x600 mm), nominal.
  - 3. Thickness (finished pile): 0.099 inch (2.51 mm).
  - 4. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
  - 5. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
  - 6. Gage: 1/12 inch (47.2 per 10 cm).
  - 7. Stitches: 12.0 per inch (47.24 per 10 cm).
  - 8. Tufted Weight: 17.0 (576 g / sq. m).
  - 9. Primary Backing Material: Synthetic.
  - 10. Secondary Backing Material: EcoFlex.

**2.03 ACCESSORIES**

- A. Edge Strips: Rubber, color as selected.
- B. Carpet Tile Adhesive: Recommended by carpet tile manufacturer.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for alkalinity (pH).
  - 1. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

**3.02 PREPARATION**

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.

**3.03 INSTALLATION**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Fully adhere carpet tile to substrate.

- G. Trim carpet tile neatly at walls and around interruptions.
- H. Complete installation of edge strips, concealing exposed edges.

**3.04 CLEANING**

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

**END OF SECTION**

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**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: 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, coordinate thickness with wall type.
  - 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) and R of 19 (RSI 3.3).
  - 4. Thickness: 3 1/2 inches (89 mm) and 6 1/4" (159 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.

**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.
  - 1. 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. Roof mechanical equipment screen.
  - 6. Floors, unless specifically indicated.
  - 7. Ceramic and other types of tiles.
  - 8. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
  - 9. Glass.
  - 10. 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-UPS**

- 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. PPG Paints: [www.ppgpaints.com/#sle](http://www.ppgpaints.com/#sle).
  - 2. Sherwin-Williams Company: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
  - 3. Benjamin Moore & Co.: [www.benjaminmoore.com](http://www.benjaminmoore.com).
- 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: As indicated in Color Schedule.
  - 1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
  - 2. 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-3A - Concrete/Masonry, Opaque, Acrylic, 3 Coat:
  - 1. One coat of block filler.
  - 2. Satin: Two coats of elastomeric.
- C. Paint ME-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
  - 1. One coat of latex primer.
  - 2. Semi-gloss: Two coats of latex enamel.
- D. 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.
- E. 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.

#### **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 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. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, and lead items.
  - 6. Floors, unless specifically indicated.
  - 7. Ceramic and other tiles.
  - 8. Glass.
  - 9. 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. SSPC-SP 1 - Solvent Cleaning; 2015, with Editorial Revision (2016).
- D. SSPC-SP 2 - Hand Tool Cleaning; 2018.
- 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 products to be used in project; 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 gal (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 of three years of 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. Provide lighting level of 80 fc (860 lux) 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. PPG Paints: [www.ppgpaints.com/#sle](http://www.ppgpaints.com/#sle).
  - 2. Benjamin Moore & Co.: [www.benjaminmoore.com](http://www.benjaminmoore.com).
  - 3. Sherwin-Williams Company: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
    - a. Basis of Design or approved equal.
- 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:
  - 1. Selection to be made by Architect after award of contract.
  - 2. Allow for minimum of ten 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.

**2.03 PAINT SYSTEMS - INTERIOR**

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, uncoated steel, 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:
  - 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.
  - 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 gypsum board, 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 and for all painted finishes in the Welding Shop.
  - 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 CI-OP-3E - Concrete/Masonry, Epoxy Enamel, 3 Coat:
  - 1. One coat of catalyzed epoxy primer.
  - 2. Semi-Gloss: Two coats of catalyzed epoxy enamel.
- G. Paint GI-OP-3A - Gypsum Board/Plaster, Alkyd, 3 Coat:
  - 1. One coat of alkyd primer sealer.
  - 2. Semi-gloss: Two coats of industrial alkyd urethane.
  - 3. Locations: All toilet room gypsum board walls.
- H. 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. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
  - 3. 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.
  - 1. General Storage rooms 617 and 618 are existing rooms that were previously used for coal storage and coal fired boiler rooms. Coal residue is on all surfaces and must be thoroughly cleaned and prepared by methods recommended by the manufacturer. Minimum requirements include:
    - a. Thorough cleaning.
    - b. Application of stain kill primer.
    - c. Application of block filler.
    - d. Application of epoxy paint.

- 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. Masonry:
  - 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content, alkalinity of surfaces, or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
  - 2. Prepare surface as recommended by top coat manufacturer.
- G. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Galvanized Surfaces:
  - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
  - 2. Prepare surface according to SSPC-SP 2.
- I. 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.
- J. 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.
- 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 09 93 00  
STAINING AND TRANSPARENT FINISHING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of transparent finishes.

**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 (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; Current Edition.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition.

**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.
  - 2. Manufacturer's installation instructions.
- C. Certification: By manufacturer that stains and transparent finishes comply with VOC limits specified.
- D. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, safety data sheets (SDS), care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.
- E. 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 Stain and Transparent Finish Materials: 1 gallon (4 L) of each color and type; from the same product run, store where directed.
  - 3. Label each container with color and type in addition to the manufacturer's label.

**1.04 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.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of stain or transparent finish, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Stain and Transparent Finish 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.

**1.06 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by manufacturer of stains and transparent finishes.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Provide finishes used in any individual system from the same manufacturer; no exceptions.
- B. Provide finishes from the same manufacturer.
- C. Transparent Finishes:
  - 1. Behr Process Corporation: [www.behr.com/#sle](http://www.behr.com/#sle).
  - 2. PPG Paints: [www.ppgpaints.com/#sle](http://www.ppgpaints.com/#sle).
  - 3. Sherwin-Williams Company: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Stains:
  - 1. Behr Process Corporation: [www.behr.com/#sle](http://www.behr.com/#sle).
  - 2. PPG Paints: [www.ppgpaints.com/#sle](http://www.ppgpaints.com/#sle).
  - 3. Sherwin-Williams Company: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 STAINS AND TRANSPARENT FINISHES - GENERAL**

- A. Finishes:
  - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at [www.paintinfo.com](http://www.paintinfo.com), for specified MPI categories, except as otherwise indicated.
  - 2. Provide finishes 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.
  - 3. 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.
  - 4. Supply each finish material in quantity required to complete entire project's work from a single production run.
  - 5. Do not reduce, thin, or dilute finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
  - 1. Provide stains and transparent 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.

**2.03 INTERIOR STAIN AND TRANSPARENT FINISH SYSTEMS**

- A. Finish on Wood - Trim:
  - 1. Sealer: Water-Based, Sanding Sealer, Clear.
  - 2. Top Coat(s): Clear Water-Based Varnish; MPI #128, 129, or 130.
  - 3. Top Coat Sheen:
    - a. Satin: MPI gloss level 4; use this sheen at all locations.

**2.04 ACCESSORY MATERIALS**

- A. Accessory Materials: Cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of finished surfaces.
- B. Fastener Head Cover Material: Latex filler.



**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Do not begin application of stains 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.

**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. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

**3.03 APPLICATION**

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- E. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- F. Reinstall items 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. Interior directional and informational signs.
- C. Dimensional letter signs.
- D. Building street number.
- E. County seal.

**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.

**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.
- I. Manufacturer's Qualification Statement.

**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. FASTSIGNS: [www.fastsigns.com/#sle](http://www.fastsigns.com/#sle).
  - 3. Inpro: [www.inprocorp.com/#sle](http://www.inprocorp.com/#sle).
    - a. Boston Basis of Design or approved substitution.
  - 4. Mohawk Sign Systems, Inc: [www.mohawksign.com/#sle](http://www.mohawksign.com/#sle).
  - 5. Seton Identification Products: [www.seton.com/aec](http://www.seton.com/aec).
  - 6. ASI Sign Systems, Inc: [www.asisignage.com](http://www.asisignage.com).
  - 7. Gemini, Inc.: [www.geminisigns.com](http://www.geminisigns.com).
  - 8. Avalis Wayfinding Solutions: [www.avalisway.com](http://www.avalisway.com).
  - 9. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Dimensional Letter Signs:
  - 1. FASTSIGNS: [www.fastsigns.com/#sle](http://www.fastsigns.com/#sle).
  - 2. Inpro: [www.inprocorp.com/#sle](http://www.inprocorp.com/#sle).
  - 3. Mohawk Sign Systems, Inc: [www.mohawksign.com](http://www.mohawksign.com).
  - 4. Gemini Incorporated: [www.geminisigns.com](http://www.geminisigns.com).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Plaques:
  - 1. Artistic Bronze: [www.artisticbronze.net](http://www.artisticbronze.net).
  - 2. Franklin Bronze Plaques: [www.franklinbronzeplaques.com](http://www.franklinbronzeplaques.com).
  - 3. Gemini Incorporated: [www.geminisignproducts.com](http://www.geminisignproducts.com).
  - 4. 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.
  - 3. Copy Position: As indicated on drawings.
  - 4. Sign Height: As necessary for compliance with ANSI/ICC A 117.1 Chapter 7.
  - 5. 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.
  - 6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.
  - 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 10" with a gender symbol and the verbal description placed directly below followed by Grade 2 braille.

**2.03 INTERIOR DIRECTIONAL AND INFORMATIONAL SIGNS**

- A. Sign Type: Same as room and door signs.
- B. Wording of signs is scheduled on drawings.

- C. Where suspended, ceiling mounted, or projecting from wall signs are indicated, provide two-sided signs with same information on both sides.

#### **2.04 BUILDING IDENTIFICATION SIGNS**

- A. Use individual metal letters.
- B. Mount on outside wall in location indicated on drawings.

#### **2.05 BUILDING STREET NUMBER**

- A. Use individual die cut vinyl numbers.
  - 1. Size: 10 inches.
  - 2. Color: As selected by Architect from manufacturer's full range.
- B. Content: As directed by owner.
- C. Location: As directed by owner.

#### **2.06 SIGN TYPES - FLAT**

- A. Flat Signs: Signage media without frame.
  - 1. Edges: Square.
  - 2. Corners: Square.
  - 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.
  - 5. Suspended Mounting: Stainless steel suspension cables, cable clamps, and ceiling fastener suitable for attachment to ceiling construction indicated.
- 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 from manufacturer's full range.

#### **2.07 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: Square.
  - 4. Mounting: Tape Adhesive.
  - 5. Application: Tactile "EXIT" signs at each exit door.

#### **2.08 PLAQUES**

- A. Metal Plaques:
  - 1. Metal: Bronze casting.
  - 2. Metal Thickness: 1/8 inch (3 mm), minimum.
  - 3. Size: As indicated on drawings.
  - 4. Text and Typeface:
    - a. Character Font: Helvetica, Arial, or other sans serif font.
    - b. Character Case: Upper case only.
    - c. Character Color: Contrast with background color.
  - 5. Border Style: As indicated on drawings.
  - 6. Background Texture: Leatherette.
  - 7. Surface Finish: Brushed, satin.
  - 8. Painted Background Color: Black.
  - 9. Protective Coating: Manufacturer's standard clear coating.
  - 10. Manufacturer: International Bronze Plaque Company (Basis of Design or approved substitution).

11. Mounting: Blind studs.
- B. County Seal:
  1. Manufacturer: International Bronze Plaque Company (Basis of Design).
  2. Material: Cast bronze.
  3. Size: Varie - as indicated on plans.
  4. Border: Custom.
  5. Letter Style: Custom.
  6. Mounting Method: Concealed mounting.
  7. Background Color: Custom.
  8. Content: Custom as indicated on plans.

## **2.09 DIMENSIONAL LETTERS**

- A. Metal Letters:
  1. Metal: Aluminum casting.
  2. Metal Thickness - Exterior: 2 inch minimum (50 mm).
  3. Metal Thickness - Interior: 1 inch minimum (25mm).
  4. Letter Height: As indicated on drawings.
  5. Text and Typeface:
    - a. Character Font: Helvetica, Arial, or other sans serif font.
    - b. Character Case: Upper case only.
  6. Finish: Baked enamel.
    - a. Color: To be selected by Architect from manufacturer's full range.
  7. Product: ASI Series LF Light Weight Fabricated Metal Dimensional Letters Basis of Design or approved substitution.
  8. Mounting: Projected stud.
  9. Content: As indicated on plans.

## **2.10 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. Protect from damage until Date of Substantial Completion; 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**

Division 10

New Facility For  
North Granville County Senior Center

**SECTION 10 14 16  
PLAQUES**

**PART 2 PRODUCTS**

**1.01 PLAQUES**

**END OF SECTION**

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**SECTION 10 21 13.13  
METAL TOILET COMPARTMENTS**

**PART 2 PRODUCTS**

**1.01 COMPONENTS**

- A. Toilet Compartments: Powder coated steel, floor-mounted unbraced.
- B. Doors, Panels, and Pilasters: Sheet steel faces, pressure bonded to sound deadening core, formed and closed edges; corners made with corner clips or mitered, welded, and ground smooth.

**END OF SECTION**

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**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.
- C. Utility room accessories.

**1.02 REFERENCE STANDARDS**

- A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 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 A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2023.
- D. ASTM C1036 - Standard Specification for Flat Glass; 2021.
- E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2018.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with the placement of internal wall reinforcement 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 Architect .
- 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 - TD: Jumbo roll, surface mounted.
  - 1. Cover: Stainless steel.
  - 2. Capacity: 10 inch roll.
  - 3. Product: ASI 0042 manufactured by ASI or approved substitution.
- B. Paper Towel Dispenser - PT: Folded paper type, stainless steel, surface-mounted, with viewing slots on sides as refill indicator and tumbler lock.
  - 1. Capacity: 400 minimum.
  - 2. Product: 0210 manufactured by ASI or approved substitution.
- C. Soap Dispenser - SD: Liquid soap dispenser, wall-mounted, surface, with stainless steel cover and vertical stainless steel tank and working parts; push type soap valve, check valve, and window gage refill indicator, tumbler lock.
  - 1. Minimum Capacity: 40 ounces (1.2 liters).
  - 2. Product: 0347 manufactured by ASI or approved substitution.
- D. Mirrors - 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 - GB: Stainless steel, peened 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, exposed 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 UTILITY ROOM ACCESSORIES

- A. Combination Utility Shelf/Mop and Broom Holder - 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 room.
    - 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: As required by accessibility regulations, unless otherwise indicated.

**3.04 PROTECTION**

- A. Protect installed accessories from damage due to subsequent construction operations.

**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 - Standard for Safety of Window Covering Products; 2022.

**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 Architectural: [www.hunterdouglasarchitectural.com/#sle](http://www.hunterdouglasarchitectural.com/#sle).
  - 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.

**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. 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 from manufacturer's full range.
- D. Slat Support: Woven polypropylene cord, ladder configuration.
- E. 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.
- F. Bottom Rail: Pre-finished, formed steel; with end caps.

## Division 12

1. Color: Same as headrail.
- G. Lift Cord: Braided nylon; continuous loop; complying with WCMA A100.1.
  1. Free end weighted.
- H. 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.
- I. Headrail Attachment: Wall brackets.
- J. 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.
- C. Install at all exterior windows/storefronts unless specifically noted otherwise.

**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**



## **SECTION 220000 – PLUMBING REQUIREMENTS**

### **A. GENERAL**

#### **1. GENERAL CONDITIONS**

- a. Drawings, all Contract Documents, and Division-1 Specifications sections, apply to work of this Section.
- b. Where the term "Contractor" is used it shall mean the Plumbing Contractor.
- c. Contractors bidding on this section are notified that they shall hold a license for Plumbing as issued by the North Carolina State Board of Examiners of Plumbing and Heating Contractors.
- d. Reference shall be made to the Architectural, Structural, Heating and Air-conditioning, and Electrical drawings and specifications for details of building construction and for coordination with other parts of construction.
- e. Contractor shall visit the job site before the submission of a bid and familiarize himself with existing conditions. Submission of a bid will be considered as evidence that the Contractor has visited the site and is familiar with existing conditions.

#### **2. BIDDING**

- a. See General conditions.

#### **3. SCOPE OF THE WORK**

- a. The work to be done under this contract consists of furnishing all labor, materials, equipment, devices, appliances, tools, transportation, and services as required, and in performing all functions to completion and leave ready for operation the installation of the plumbing work in strict accordance with these specifications and applicable drawings and subject to the terms and conditions of the contract.
- b. Obtain all permits and make all test.

#### **4. INTENT**

- a. It is the intention of the specifications and drawings to call for finished work, tested, and ready for operation. Work shall be installed in accordance with the drawings and specifications using skilled workmen.
- b. It shall be the responsibility of this Contractor upon discovering any discrepancies in the drawings or specifications or points of conflict therein, to immediately notify the Owner who will clarify such discrepancies or conflicts in writing before the

work progresses beyond said point. No extras will be allowed because of failure to properly notify the Owner.

#### 5. CODE, PERMITS AND INSPECTIONS

- a. All work under this specification shall comply with all local and state codes, laws, ordinances and regulations. Wherever the drawings and specifications are in excess of such laws, ordinances and regulations, the drawings and specifications shall hold.
- b. Contractor shall obtain permits and arrange all inspections necessary for the installation of this work, paying all fees in connection therewith, and furnishing the Owner with certificates of inspection from all authorities having jurisdiction.
- c. No piping or other construction shall be covered up or concealed until it has been inspected, tested and approved. The Contractor shall furnish all labor, materials, water, fuel, equipment, and apparatus and bear all expenses of such tests as are hereinafter specified for the work under this section of the specifications.

#### 6. DRAWINGS AND SPECIFICATIONS

- a. The plumbing drawings show the general arrangement of all piping, equipment and appurtenances and shall be followed as closely as actual building construction will permit.
- b. Plumbing work shall conform to the requirements shown on all the drawings. Architectural and Structural drawings shall take precedence over Plumbing drawings. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings, valves and accessories as may be required to meet such conditions.
- c. The drawings and specifications are complementary each to the other and what is called for by one shall be as binding as if called for by both.
- d. Omission of particular reference to any item necessary for a complete installation and proper operation thereof, shall not relieve the Contractor of the responsibility of furnishing same.

#### 7. COORDINATION OF WORK

- a. The Contractor shall coordinate the work with other contractors on the project. All work shall be so arranged that there will be no delay in the proper installation and completion of any part or parts of all piping systems and equipment. Work shall be installed in proper sequence with other trades, and without unnecessary delays.

- b. The layout shown shall be followed as closely as circumstances will permit but the Contractor must lay out his work so as not to conflict with other trades and to avoid any unnecessary cutting of or damage to walls, floors or other parts of his equipment.
- c. Whenever interferences might occur, before installing any of the work in question, the Contractor shall consult with other contractors and shall come to an agreement with them as to the exact location and level of his piping and other parts of his equipment.
- d. Locations of pipes, equipment, and appurtenances shall be adjusted to accommodate the work to interferences anticipated and encountered. The Contractor shall determine the exact route and location of each pipe prior to fabrication. Lines, which pitch, shall have right of way over those which do not pitch. Lines whose elevations cannot be changed shall have right of way over lines whose elevations can be changed.
- e. Offsets and changes in direction in pipes shall be made as required to maintain proper head room and pitch of sloping lines whether or not indicated on the drawings. The Contractor shall furnish and install all accessories as required to effect these offsets and changes in direction.

## 8. EQUIPMENT AND MATERIALS

- a. Catalog numbers and trade names in these specifications and noted on the drawings are intended to describe the material, devices or apparatus wanted. Similar materials, devices or apparatus of other manufacturers, if of equal quality, capacity and character, may be substituted on the written approval of the Owner. If the Contractor fails to comply with the provisions of this paragraph, he shall be required to furnish all materials and equipment as specified.
- b. All materials shall be new and bear the manufacturer's name, trade name and the UL Label in every case where a standard has been established for the particular material. The equipment to be furnished shall be essentially the standard product of a manufacturer regularly engaged in the production of the required type of equipment, and shall be the manufacturer's latest approved design.
- c. Equipment and materials shall be delivered to the site and stored in original containers, suitably sheltered from the elements, but readily accessible for inspection until installed.
- d. Equipment and materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance.

- e. Equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury and theft. Damage or defects developing before acceptance of the work shall be made good at the Contractor's expense.
- f. Dimensions: It shall be the responsibility of the Contractor to insure that items to be furnished fit the space available. He shall make necessary field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the drawings and specifications.

## 9. EQUIPMENT ACCESSORIES

- a. The Contractor shall furnish and install all equipment, accessories, connections and incidental items necessary to fully complete the work, ready for use, occupancy and operation by the Owner.
- b. Supports: The Contractor shall support plumb, rigid and true to line all work and equipment furnished under this section. The Contractor shall study thoroughly all general, structural, mechanical and electrical drawings, shop drawings, and catalog data to determine how equipment, fixtures, piping, etc., are to be supported, mounted or suspended and shall provide extra steel bolts, inserts, pipe stands, brackets and accessories for proper support whether or not shown on the drawings.

## 10. CUTTING, PATCHING, AND REPAIRING

- a. In new construction, the General Contractor will provide all openings in wall, floor, and roof construction required by the Plumbing Contractor for installation of his work, provided complete information is furnished to the General Contractor at the time required. Failure to provide necessary information will necessitate provisions of additional required openings, chases, recesses, etc., by Plumbing Contractor at his own expense, and he shall be fully responsible for the proper cutting and patching of such construction as approved and directed by the Owner.
- b. Where pipes or conduit pass through walls, floors, or roofs, sleeves shall be furnished by this Contractor and installed, except as noted otherwise, by the trade furnishing and installing the material in which they are located. Location of sleeves, inserts, and supports shall be as directed by this Contractor who will also insure that they are properly installed. Sleeves shall be neatly sawed, sheared, or cut with wheeled cutters. No flame cutting will be permitted.
- c. Each trade shall bear the expense of all cutting, patching, repairing or replacing of the work of other trades required because of his fault, error or tardiness or because of any damage done by him.
- d. Under no circumstances shall the Contractor cut any structural beam or support without prior approval and instructions from the Owner.

- e. If Plumbing Contractor installs Plumbing work through exposed finish walls, ceiling or floor after they are in place, the Plumbing Contractor shall close excess openings around his work to match finish surface.

#### 11. SHOP DRAWINGS AND SUBMITTAL DATA

- a. The Contractor shall submit to the Owner after the award of the contract, a folder containing catalog cuts and descriptions giving name of manufacturer, trade name, type, catalog number and location in work, of all equipment which he proposes to use in the execution of the contract.
- b. Approval is solely for the purpose of determining suitability and will in no way absolve the Contractor of his responsibility for the correctness of measurements, quantities, or performance. Approval of shop drawings shall not constitute a change in the contract requirements.
- c. Shop drawings must comply with the requirements of all regulatory bodies having jurisdiction.
- d. Contractor shall furnish at least five (5) copies of submittal data. Three (3) copies will be returned to the Contractor. If the Contractor desires the return of more than three (3) copies, additional copies shall be furnished at the time of original submission.

#### 12. WORKMANSHIP

- a. The work throughout shall be executed in the best and most thorough manner, under the periodic observation of and to the satisfaction of the Owner and Engineer who will jointly interpret the meaning of the drawings and specification, and shall have the power to reject any work or materials which, in their judgment, are not in full accordance therewith.

#### 13. SINGULAR

- a. In all cases where a device or piece of equipment is referred to herein or on the drawings in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

#### 14. USE OF THE WORD "PROVIDE"

- a. Herein, where the word "Provide" is written in these specifications, provide shall be understood to mean provide complete in place, that is, "Furnish and Install".

#### 15. SUPERVISION AND SUPERINTENDENCE

- a. The Contractor shall, during the progress of the work, maintain a competent superintendent, who shall not be change d except if he proves unsatisfactory to the

Contractor or the Owner. Efficient supervision shall be given to all work under this contract.

## **B. PRODUCTS**

### **1. EXCAVATION, TRENCHING, AND BACKFILL**

- a. Unless noted otherwise on the drawings, the Plumbing Contractor shall do all excavation and backfill required for his work. Unless otherwise shown, provide separate trenches for each sanitary sewer, storm sewer, and water line. Lay all pipe in open trenches except when the Owner gives written permission for tunneling.
- b. **Sheeting, Bracing, and Water Removal:** Sheet and brace trenches, and remove water as necessary to fully protect workmen and adjacent structures and permit proper installation of the work. Comply with all local regulations or, in the absence thereof, with the provisions of the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc. Under no circumstances lay pipe or install appurtenances in water. The trench shall be kept free from water until pipe joint material has hardened. The presence of ground water in the soil or the necessity of sheeting or bracing trenches shall not constitute a condition for which any increase may be made in the contract price. Sheeting shall not be removed until the trench is substantially backfilled.
- c. **Rock Excavation:** The material to be excavated is assumed to be earth and debris encountered in the project area. If rock should be encountered, an agreed extra compensation will be allowed. Earth shall include all material that can be removed by a 3/4-yard power shovel. Rock is defined as rock, stone, hard shale in original ledge, boulders, masonry and rock fragments over nine (9) cubic feet in volume, and cannot be removed by power shovel or without the use of explosives or drills.
- d. **Blasting:** The written consent and approval of method from the Owner must be obtained before explosives are used, and if used, all local regulations, laws, and ordinances shall be observed. Cover blasts with heavy timbers or mats and set off no blast within twenty-five (25) feet of pipe already laid in the trench. Protect pipe already laid with earth backfill.
- e. **Grading Trench Bottoms:** Grade the bottom of trenches evenly to insure uniform bearing for the full length of all pipes. Cut holes as necessary for joints and joint making. Excavate all rock, cemented gravel, or other hard materials to at least four (4) inches below the pipe at all points. Refill to grade with sand or fine gravel firmly compacted.
- f. **Backfill trenches only after piping has been inspected, tested and locations of pipe and appurtenances have been recorded. Backfill by hand around pipe and for a**

depth of one (1) foot above the pipe using earth without rock fragments or large stones, and tamp firmly in layers not exceeding six (6) inches in thickness, taking care not to disturb the pipe or injure the pipe coating. Compact the remainder of the backfill thoroughly with a rammer of suitable weight or with an approved mechanical tamper, in layers not exceeding six (6) inches in thickness. All cinders and rubbish shall be prohibited from all trenches.

All fill within the building shall be compacted to 95 per cent of the maximum standard Proctor density.

## 2. SANITARY, WASTE, AND VENT LINES

- a. The following lines and fittings shall be Schedule 40 PVC OR Service Weight Cast Iron:

Underfloor and underground waste lines

- b. The following lines and fittings shall be Schedule 40 PVC OR Service Weight Cast Iron:

Above floor sanitary waste lines

Above floor vent lines

- c. Installation:

- i. Piping of sizes shown shall be run as indicated on the drawings. All extensions above the roof shall be made according to code and as detailed on the drawings. Soil waste and vent stacks shall be run in partitions and suspended above ceilings where indicated. Vertical vent pipes shall be connected together into one main vent stack or riser above the fixtures and vented as indicated on riser diagrams. Vents and branch vent lines shall be free from drops or sags and be graded and connected so as to drip back into the soil or waste pipe by gravity. Where vent pipes connect to the horizontal soil or waste pipe, the vent branch shall be taken off above the center line of the pipe and the vent pipe extended vertically or at an angle of forty-five (45) degrees to the vertical before off-setting or connecting to branch, main waste or soil vent.
- ii. Vents from any fixture or line of fixtures, when connected to a vent line serving other fixtures, shall be extended at least six (6) inches above the flood level rim of the highest of such fixtures to prevent use of the vent line as a waste. Extensions of vent pipes through a roof shall be terminated not less than twelve (12) inches above the roof.
- iii. Horizontal drainage piping shall be installed in practical alignment at the grade shown on the drawings, but in no case less than a uniform grade of 1/8

inch per foot for sizes 3" and larger. For sizes 2" and smaller grade shall be not less than 1/4 inch per foot.

- iv. Changes in direction in drainage piping shall be made by the appropriate use of forty-five (45) degrees wyes, half-wyes, or long sweep quarter, sixth, eighth, or sixteenth bends. Sanitary tees or short quarter bends may be used when two (2) fixtures are installed back to back and have a common drain. Straight tees, elbows, and crosses may be used on vent lines. No change in direction of flow greater than ninety (90) degrees shall be made. Where different sizes of drainage pipes or pipes and fittings are to be connected, standard increasers and reducers of proper size shall be used. Reduction of the size of drainage piping in the direction of flow is prohibited.
- v. Drilling and tapping of house drains, soil, waste or vent pipes, and the use of saddle hubs and bands are prohibited.
- vi. Cross-connections or any fixtures, devices, or construction which will permit backflow connections between a water distribution system and any part of the drainage system shall not be installed.
- vii. All piping shall be made permanently gas and water tight. Any fitting or connection which has an enlargement, chamber, or recess with a ledge or shoulder or reduction of the pipe area that offers an obstruction to flow through the pipe shall not be installed. Threaded joints shall be made with a lubricant on the male thread only. All burrs or cutting shall be removed and pipe shall be reamed or filed out to not less than the original diameter.
- viii. Floor connections for water closets and other fixtures shall be made by means of an approved brass, or iron flange, caulked, into the drainage pipe. The connection shall be bolted, with an approved gasket or approved setting compound between the fixture base and the connections.

### 3. WATER PIPING, COLD AND HOT

- a. Copper tubing, water, ASTM Specification B-88-55, Type K and Type L.
- b. Soldered joint fittings, wrought type, American Standard Specification B-16 22-1951. Fittings to be of same manufacturer as copper tubing.
- c. Silver Solder: 15% silver, 80% copper, 5% phosphorous conforming to ASTM B 260-52T.
- d. 95/5 Solder: 95% tin, 5% antimony.
- e. Above-ground Piping: Seamless, type L, hard drawn copper with wrought copper fittings.



- f. Underground Piping: Piping shall be seamless, type K, soft copper with wrought copper fittings.
- g. Valves: Valves shall have the name and trademark of the manufacturer and the guaranteed working pressure cast on the body of the valve. All valves shall be of one manufacturer and identified by manufacturer's catalog number stamped on a metal disk located under the valve handle nut. Valves shall be bronze NIBCO S-111 or approved equal.
- h. Installation:
  - i. 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 20ft. Markers shall be fully legible from floor level showing medium contained in pipe, and direction of flow.
  - ii. Contractor shall provide hot and cold water mains with branches and risers complete from point indicated on plans running to all fixtures and other outlets indicated. Mains and branches shall be run generally as shown on the drawings. Contractor shall provide all interior water piping, branches, and risers as shown on the drawing and shall make connections to all plumbing fixtures, hose bibbs, wall hydrants, and other points requiring water under this and other divisions of the specifications.
  - iii. All water mains and branches shall be pitched at least one (1) inch in twenty-five (25) feet toward fixtures. The piping installation shall be arranged so that the entire system can be drained through fixture supply connections. Unions shall be installed at the connections to each piece of equipment to allow removal of equipment without dismantling connecting piping.
  - iv. Size of all water piping shall be as shown on the drawings. Sizes for connections to fixtures and equipment shall be not less than shown in the schedules on the drawings.
  - v. Plumbing Contractor shall be held responsible for any damage to any work installed by others caused by leaks or improper installation of the piping system. The Contractor shall coordinate his work with that of the Heating Contractor and where interference occurs, shall procure approval from the Owner before installation of the work.
  - vi. Provide eighteen (18) inch high air chambers at fixtures with flush valves. At other fixtures air chambers shall be eighteen (18) inches high. Pipe size for air chambers shall be same as supply to fixture.
  - vii. Soldered or Bronzed Joints: Joints 1-1/4 inches and larger shall be made with silver solder. For joints less than 1-1/4 inches and all valves (regardless

of size) use 95/5 solder. Also use a non-corrosive paste flux in accordance with manufacturer's instructions. All joints shall be thoroughly cleaned with emory cloth and reamed cut before assembly. Acid core solder will not be permitted.

- viii. Pipe penetrations through floor slabs and fire rated walls shall be restored to the slab or fire rated wall's original rating and shall be sealed with impervious non-combustible materials sufficiently tight to prevent transfer of smoke or combustion gases from one side of the wall or slab to the other in accordance with UL methods.
- ix. As appropriate to the penetration size and location, provide firestopping using one of the following:
  - x. High-temperature non-shrink grout shall be installed in accordance with recommendations of ACI, CSI and the manufacturer's specifications.
  - xi. Fill openings with Thermafiber Safing insulation.
  - xii. Caulk full depth of wall or floor with 3M fire barrier; material - No. 25 caulk or 303 putty.
  - xiii. Penetrations through existing construction shall be neatly drilled or cut, and the opening completely filled around the penetrating pipe with the approved firestopping material. Solid masonry and concrete walls as well as concrete slabs shall be core drilled. Diameter of core drilled holes shall be from 3/4 inch to 1-1/2 inch bigger than the outside diameter of pipe. Pipe shall be secured within 18 inches of the penetration, both sides, from other than the fire wall or slab itself.

#### 4. OPEN ENDS

- a. This Contractor shall keep all ends of piping including those extending above the roof, drains, and fixture branches closed with caps or plugs so as to prevent dirt from building materials from getting into pipes and traps during construction.

#### 5. HANGERS, ANCHORS, AND GUIDES

- a. All piping in building shall be rigidly supported from the building structure by means of approved hangers and supports. Piping shall be supported to maintain required grading and pitching of lines, to prevent vibration, and to secure piping in place and shall be so arranged as to provide for expansion and contraction.
- b. Generally, pipe hangers shall be attached to 1-1/2" x 1- 1/2" x 1/4" angles supported between joists or supported from clamps attached to bar joists. Use trapeze hangers, 1-1/2" x 1-1/2" x 1/4" angles, where possible and lines can be grouped. Trapeze hanger to be supported from joists by beam clamps.

- c. Spacing of hangers shall not be greater than the following:
  - i. Horizontal soil pipe, 5'-0" on centers.
  - ii. Copper tubing, 2" size, 10'-0" on centers,  
1-1/2" and smaller 6'-0" on centers.
  - iii. In addition, provide two (2) hangers at each turn in horizontal line approximately two (2) feet from fitting.
- d. Hangers shall be adjustable steel clevis, MSS Type 1. Select size of hangers to exactly fit pipe size for bare piping and to exactly fit around piping insulation with saddle of shield for insulated piping. Provide copper plated hangers and supports for copper piping that do not receive insulation.
- e. Hanger rods shall not be less than the following sizes and machine threads:

2" and smaller	3/8" diameter
2-1/2" and 3"	1/2" diameter
3-1/2", 4" and 5"	5/8" diameter

- f. Provide fastening devices, turnbuckles or other leveling devices, locknuts, rods and inserts as required to properly support the piping systems.

6. PIPE INSULATION

- a. All hot and cold water piping in building shall be insulated.
- b. Piping shall be insulated with premoulded glass fiber. Jacket shall be factory applied white kraft bonded to aluminum foil, reinforced with fiberglass yarn. Insulation shall be Johns-Manville Flame-Safe with VB jacket or equal by Owens Corning or Certainteed - 1" thick for all piping and all pipe sizes.
- c. Provide 4" sealing strips of jacket for butt joints. Securely fasten jacket at longitudinal laps and sealing strips with adhesive and flare-door type staples 3 to 4 inches on centers. Each staple shall be sealed after installation with adhesive. Adhesive shall be Foster Spark-FAS 85-20. Apply according to manufacturer's recommendations.
- d. At hanger locations, the Contractor shall furnish and install insulation protection saddle between insulation and hanger. Insulation shall pass through hanger unbroken.
- e. All fittings, valve bodies, etc., to be insulated with machined fiberglass fitting covers and PVC ZIP jackets as manufactured by Speed Line Manufacturing Company. Install according to manufacturer's recommendations.

- f. Insulation shall pass through all sleeves and walls unbroken.
- g. All insulation material shall have 25/50 smoke and flame rating.

7. PLUMBING FIXTURES

- a. The best quality of plumbing fixtures and trimmings shall be provided, fabricated by a manufacturer of established reputation, and all plumbing fixtures shall be of same manufacturer through entire job.
- b. All fixtures shall have the manufacturer's guarantee label or trademark indicating first quality. All enameled ware shall bear the manufacturer's symbol signifying acid resisting enamel.
- c. Quantities: The Contractor is referred to the Architectural and Plumbing drawings for the quantities of fixtures to be furnished under this division of the specifications which shall be deemed to include all plumbing fixtures shown of the type described hereinafter, complete with all necessary trimmings.
- d. All supply fittings to lavatories, urinals, and water closets through wall to valve and to fixture shall be chrome plated brass, complete with chrome plated escutcheon.
- e. The fixtures herein, specifying catalog numbers, show the type and quality of plumbing fixture desired in each instance. Owner approved equal fixtures of the following manufacturers will be acceptable.

Fixtures	American-Standard, Kohler, Eljer, Elkay, Just
Trim	As for fixtures plus Chicago Faucet, Sloan, Delta, Symmons, McGuire
Seats	Church, Beneke, Olsonite
Carriers	Josam, Wade, Zurn
Floor Drains	Josam, Wade, Zurn
Cleanouts	As for floor drains
Water Cooler	Halsey Taylor, Elkay, Sunroc
Water Heater	Rudd, State, A.O. Smith

- f. All fixtures shall be white
- g. Refer to drawings for fixture schedule.

**C. EXECUTION****1. ELECTRICAL CONNECTIONS OF EQUIPMENT**

- a. Wiring from disconnect switches, junction boxes, panel board circuit breakers, etc. up to mechanical equipment shall be by the electrical contractor. Final electrical connections to plumbing equipment shall be by this contractor.
- b. Control wiring and control connections for plumbing systems is by this Contractor.

**2. PROTECTION DURING CONSTRUCTION**

- a. Plumbing fixtures and trim shall be protected against damage or injury due to building materials, acid, tools, equipment, or any causes incidental to construction.
- b. The finished surface of each fixture shall be covered with building paper or similar protection. All fixtures damaged by any cause, and any trim with marred or scratched finish shall be replaced at nocost to the Owner. The fixture and fixture trim protection shall be removed at the completion of construction.

**3. TESTS**

- a. Concealed work shall remain uncovered until required tests have been completed, but if necessary, tests on portions of the work may be made and those portions of the work may be concealed after being proved satisfactory. Repairs of defects that are discovered as a result of inspections or tests shall be made with new materials. Caulking of screwed joints, cracks, or holes will not be accepted. Test shall be repeated after defects have been eliminated.
- b. Drainage System Tests:
  - i. A water test shall be applied to all parts of the drainage systems before the pipes are concealed or fixtures set in place. The test may be applied in sections. All openings of each system to be tested shall be tightly closed except the highest opening above roof, and the entire system shall be filled with water up to the overflow point of this highest opening.
  - ii. All parts of the system shall be subject to not less than ten (10) feet of hydrostatic head except the uppermost ten (10) feet of the piping directly below the opening. The water shall remain in the system for not less than fifteen (15) minutes after which time no leaks at any joint or lowering of the water level at the overflow shall be visible.
- c. Water Supply System:
  - i. A water pressure test shall be applied to all parts of the water supply system before the piping is concealed or before the fixtures are connected. A hydrostatic pressure of not less than one hundred twenty-five (125) pounds

per square inch shall be applied to the system, and there shall be no leaks at any point in the system at this pressure. An air or gas test is not acceptable.

#### 4. STERILIZATION

- a. All the new water piping and affected existing water piping, including all valves, fixtures, fittings, and other devices connected hereto, shall be sterilized with a solution containing not less than fifty (50) parts per million of available chlorine. The chlorinating material shall be liquid chlorine gas-water mixture, calcium hypochlorite, sodium hypochlorite, or chlorinated lime and water mixture conforming to the standards of the American Water Works Association and shall be introduced into the system in an approved manner.
- b. The sterilization solution shall be allowed to remain in the system for a minimum period of twenty-four (24) hours, but until pronounced safe and fit for human consumption by the Owner based on samples drawn from the system and tested. During the sterilizing period all valves and outlets shall be opened and closed several times. After sterilization, the solution shall be flushed from the system with clean water until residual chlorine content is not greater than 0.2 parts per million unless otherwise directed. After the system has been flushed, additional samples will be taken and tests made; if the water is found unsafe for human consumption, the sterilization procedure specified herein before shall be repeated.

#### 5. CLEANING AND ADJUSTING

- a. Upon completion of work, all surplus material and rubbish shall be removed from premises. Fixtures shall be cleaned; all valves adjusted; all escutcheons and plates installed; all floor drains cleaned, and all mortar and foreign matter removed from all exposed plumbing work.
- b. Any stoppage or discoloration or other damage to parts of the building, its finish, or furnishing, due to the Contractor's failure to properly clean the piping system shall be repaired by the Contractor without cost to the Owner.

#### 6. EMERGENCY REPAIRS

- a. The Owner reserves the right to make, or have made, repairs to the plumbing system within the guarantee period as required to keep the equipment in operation when the Plumbing Contractor is not available to make the necessary repairs. These necessary repairs shall in no way void the Contractor's guarantee bond nor relieve the Contractor of his responsibilities during the bonding period.

#### 7. PAINTING

- a. All factory finished metal surfaces of plumbing equipment installed that are damaged during construction shall be restored to the original condition.

- b. Contractor shall paint all iron and steel, including pipe hangers, that do not have a factory finish or galvanized finish used for support of equipment. Prime with one coat of oil base primer followed by one coat of oil base finish coat.

#### 8. MAINTENANCE AND OPERATING MANUALS

- a. At the completion of this project the contractor shall furnish the Owner three (3) operating and maintenance manuals containing a brief description of each system and its various components. Instructions must give full details of the operation of all equipment installed, and shall include manufacturer's printed operating and maintenance instructions, detailed data and bulletins covering all material furnished under the contract giving all necessary illustrations and diagrams and a composite schedule of periodic servicing and lubrication requirements and replacement parts.

#### 9. AS BUILT DRAWINGS

- a. Contractor shall keep and maintain in good order a record of any waste, vent, or water piping that deviates from drawings for any reason. This record shall be made available to the Owner on the date of substantial completion and shall be legible and accurate so as to be directly transferable to an as-built reproducible drawing.
- b. Contractor shall provide to the Owner actual dimensions of all waste and water lines installed on exterior of building, giving dimensions to new and/or existing buildings.

#### 10. GUARANTEE

The Contractor shall deliver the system to the Owner complete in first-class operating condition in every respect and shall guarantee the material and workmanship for a period of one (1) year from the date of acceptance. If, during that time, any defect should show up due to defective material, negligence, or want of proper care on the part of the Contractor, he shall furnish such new materials as are necessary to repair such defects and place same in working order at his own expense on receipt of notice of such from the Owner or Owners.

END OF SECTION 220000

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**SECTION 230000 – MECHANICAL REQUIREMENTS****A. GENERAL**

## 1. GENERAL CONDITIONS

- a. Drawings, all Contract Documents, and Division-1 Specifications sections, apply to work of this section.
- b. Where the term "Contractor" is used, it shall mean the HVAC Contractor.
- c. Contractors bidding on this section are notified that they shall hold licenses for Heating H-2 and H-3 as issued by the State Board of Examiners of Plumbing and Heating Contractors.
- d. Reference shall be made to the Architectural, Structural, Plumbing and Electrical drawings and specifications for details of building construction and for coordination with other parts of construction.
- e. Contractor shall visit the job site before the submission of a bid and familiarize himself with existing conditions. Submission of a bid will be considered as evidence that the Contractor has visited the site and is familiar with existing conditions.

## 2. BIDDING

- a. The HVAC work shall be included under the General Contract.

## 3. SCOPE OF WORK

- a. The work to be done under this contract consists of furnishing all labor, materials, equipment, devices, appliances, tools, transportation, and services as required, and in performing all functions to complete and leave ready for operation the installation of the HVAC system in strict accordance with these specifications and applicable drawings; and subject to the forms and conditions of the contract.
- b. The work shall include the following items but is not intended to cover every item in detail. The list is not necessarily a complete list:
  - i. Heat Pump (DX Indoor Unit)
  - ii. Heat Pump (DX Outdoor Unit)
  - iii. Exhaust Fans
  - iv. Pipe Penetrations
  - v. Sheet Metal Work
  - vi. Grilles
  - vii. Insulation

## 4. INTENT

- a. It is the intention of the specifications and drawings to call for finished work, tested, and ready for operation. Work shall be installed in accordance with the plans and specifications using skilled workmen.
- b. It shall be the responsibility of this Contract or upon discovering any discrepancies in the drawings or specifications or points of conflict therein to immediately notify the Owner who will clarify such discrepancies or conflicts in writing before the work progresses beyond said point. No extras will be allowed because of failure to properly notify the Owner.

#### 5. CODES, PERMITS AND INSPECTIONS

- a. All work under this specification shall comply with all local and state codes, laws, ordinances and regulations particularly Volume III of the North Carolina State Building Code. Wherever the drawings and specifications are in excess of such laws, ordinances and regulations, the drawings and specifications shall hold.
- b. Contractor shall obtain permits and arrange all inspections necessary for the installation of this work, paying all fees in connection there with, and furnishing the Owner with certificates of inspection from all authorities having jurisdiction.
- c. No piping or other construction shall be covered up or concealed until it has been inspected, tested and approved. The Contractor shall furnish all labor, materials, fuel, equipment, and apparatus and bear all expenses of such tests as are hereinafter specified for the work under this section of the specifications.

#### 6. DRAWINGS AND SPECIFICATIONS

- a. The HVAC drawings show the general arrangement of all piping, ductwork, equipment, and appurtenances and shall be followed as closely as actual building construction will permit.
- b. HVAC work shall conform to the requirements shown on all the drawings. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and accessories, which may be required. The Contractor shall investigate the structural and finish conditions affecting the work and shall arrange his work accordingly, providing such fittings; valves and accessories as may be required to meet such conditions.
- c. The drawings and specifications are complimentary each to the other and what is called for by one shall be as binding as if called for by both.
- d. Omission of particular reference to any item necessary for a complete installation and proper operation thereof, shall not relieve the Contractor of the responsibility of furnishing same.

#### 7. COORDINATION OF WORK

- a. The Contractor shall coordinate the work with other contractors on the project. All work shall be so arranged that there will be no delay in the proper installation and completion of any part or parts of all piping system and equipment. Work shall be installed in proper sequence with other trades, and without necessary delays.
- b. The layout shown shall be followed as closely as circumstances will permit but the Contractor must lay out his work so as not to conflict with other trades and to avoid any unnecessary cutting of or damage to walls, floors or other supporting structural members.
- c. Whenever interferences might occur before installing any of the work in question, the Contractor shall consult with other contractors and shall come to an agreement with them as to the exact location and level of his piping and other parts of his equipment, subject to final approval of the Owner.
- d. Locations of pipes, equipment, and appurtenances shall be adjusted to accommodate the work to interferences anticipated and encountered. The Contractor shall determine the exact route and location of each duct prior to fabrication. Pipe lines which pitch shall have right of way over ductwork.
- e. Offsets and changes in direction in ducts shall be made as required to maintain proper headroom and to avoid sloping pipelines whether or not indicated on the drawings. The Contractor shall furnish and install all accessories as required to effect these offsets and changes in direction.

#### 8. EQUIPMENT AND MATERIALS

- a. Catalog numbers and trade names in these specifications and noted on the drawings are intended to describe the material, devices or apparatus wanted. Similar materials, devices or apparatus of other manufacturers, if of equal quality, capacity and character, may be substituted on the written approval of the Owner. Proposed substitutions with descriptive data shall be submitted to the Owner at least ten days before the Bid date. If the Contractor fails to comply with the provisions of this paragraph, he shall be required to furnish all materials and equipment as specified.
- b. All materials shall be new and bear the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material. The equipment to be furnished shall be essentially the standard product of a manufacturer regularly engaged in the production of the required type of equipment and shall be the manufacturer's latest approved design.
- c. Equipment and materials shall be delivered to the site and stored in original containers suitably sheltered from the elements but readily accessible for inspection until installed.
- d. Equipment and materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance.

- e. Equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury and theft. Damage or defects developing before acceptance of the work shall be made good at the Contractor's expense.
- f. Dimensions: It shall be the responsibility of the Contractor to insure that items to be furnished fit the space available. He shall make necessary field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the drawings and specifications.
- g. Manufacturer's directions shall be followed completely in the deliver, storage, protection and installation of all equipment and materials. The Contractor shall promptly notify the Owner in writing of any conflict between any requirement of the contract documents and the manufacturer's directions and shall obtain the Owner's written instruction before proceeding with the work. Should the Contractor perform any work that does not comply with the manufacturer's directions or such written instruction from the Owner, he shall bear all costs arising in correcting the deficiencies.

#### 9. EQUIPMENT ACCESSORIES

- a. The Contractor shall furnish and install all equipment, accessories, connections and incidental items necessary to fully complete the work, ready for use, occupancy and operation by the Owner.
- b. Supports: The Contractor shall support plumb, rigid and true to line all work and equipment furnished under this section. The Contractor shall study thoroughly all general, structural, mechanical and electrical drawings, shop drawings, and catalog data to determine how equipment, fixtures, piping, etc. are to be supported, mounted or suspended and shall provide extra steelbolts, inserts, pipe stands, brackets and accessories for proper support whether or not shown on the drawings.

#### 10. CUTTING, PATCHING AND REPAIRING

- a. In new construction the General Contractor will provide all openings in wall, floor, and roof construction required by HVAC Contractor for installation of his work provided complete information is furnished to the General Contractor at the time required. Failure to provide necessary information will necessitate provisions of additional required openings, chases, recesses, etc., by HVAC Contractor at his own expense, and he shall be fully responsible for the proper cutting and patching of such construction as approved and directed by the Owner.
- b. Each trade shall bear the expense of all cutting, patching, repairing or replacing of the work of other trades required because of his fault, error tardiness or because of any damage done by him.
- c. Under no circumstances shall the Contractor cut any structural beam or support without prior approval and instructions from the Owner.

- d. If HVAC Contractor installs HVAC work through exposed finish walls, ceiling or floor after they are in place, the HVAC Contractor shall close excess openings around his work to match finish surface.

#### 11. SHOP DRAWINGS AND SUBMITTAL DATA

- a. The Contractor shall submit to the Owner after award of the contract, a folder containing catalog cuts and descriptions giving the name of the manufacturer, trade name, type, catalog number and location in work of all equipment which he proposes to use in the execution of the contract.
- b. After receiving the approval of the Owner, it shall be the responsibility of the Contractor to verify all dimensions and arrangements of equipment or apparatus with job conditions to insure correct application and installation.
- c. Contractor shall then prepare, or cause to be prepared, shop drawings showing in detail (a) the equipment he has been authorized to install, and (b) the methods by which the installation of his work is to be made. Shop drawings shall show make, model number, capacity, dimensions, construction, and all pertinent data regarding the equipment to be furnished. Shop drawings shall bear Contractor's stamp certifying that he has checked each item of equipment for size, location, capacities and performance that each item meets all conditions indicated on drawings and specified.
- d. The manufacturer's standard drawings will be accepted for manufacturer's standard production items if certified for installation at the location noted. Shop drawings shall be made for all items of equipment, specially fabricated for this contract.
- e. Shop drawings shall be submitted as soon after award of the contract as possible, allowing ample time for checking and processing and the Contractor shall assume responsibility for delays incurred due to rejected items. Failure to submit suitable drawings will not be considered sufficient cause for extension of time.
- f. Approval is solely for the purpose of determining suitability and will in no way absolve the Contractor of his responsibility for the correctness of measurements, quantities, or performance. Approval of shop drawings shall not constitute a change in the contract requirement.
- g. Shop drawings must comply with the requirements of all regulatory bodies having jurisdiction.
- h. Contractor shall furnish at least five (5) copies of submittal data. Three (3) copies will be returned to the Contractor.

#### 12. WORKMANSHIP

- a. The work throughout shall be executed in the best and most thorough manner, under the periodic observation of and to the satisfaction of the Owner and the Engineer who will jointly interpret the meaning of the drawings and specifications and shall have the power to reject any work or materials which, in their judgment, are not in full accordance therewith.

### 13. SINGULAR

- a. In all cases where a device or piece of equipment is referred to herein or on the plans in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

### 14. USE OF THE WORD "PROVIDE"

- a. Herein, where the word "provide" is written in these specifications, "provide" shall be understood to mean provide complete in place, that is, "furnish and install".

### 15. SUPERVISION AND SUPERINTENDENCE

- a. The Contractor shall, during the progress of the work, maintain a competent superintendent who shall not be changed except if he proves unsatisfactory to the Contractor or the Owner. Efficient supervision shall be given to all work under this contract.

## B. PRODUCTS

### 1. SPLIT SYSTEM HEAT PUMP (DX OUTDOOR UNIT)

- a. Unit casing shall be galvanized steel, zinc phosphated, baked enamel finish and fully weatherproof.
- b. Condenser coil shall be of non-ferrous construction, aluminum plate fins, mechanically bonded to seamless copper tube, sub-cooling circuitry.
- c. Condenser fans and motors shall be direct drive, propeller type fins, Class B motor insulation, inherent protection, permanently lubricated, resiliently mounted; fans shall have safety guards.
- d. Controls shall be factory wired and include high and low pressure stats, compressor overload devices, short cycling timer (5 min.), discharge line thermostats, oil pressure switches, pressure relief valve, and circuit breakers.
- e. A wire guard shall be provided over the condenser coils for protection from physical damage. The wire guard shall be either factory mounted or field erected.
- f. Compressor shall be hermetically sealed, high efficiency, with special lubricating system, bearing surfaces and motor installation, internal over-current, over temperature, and over-pressure protection and crankcase heater. The compressor shall have a five (5) year warranty.

### 2. SPLIT SYSTEM HEAT PUMP (DX INDOOR UNIT)

- a. Casing shall be galvanized steel, bonderized with baked enamel finish.
- b. Section shall have forward curved blades, centrifugal type, belt driven. 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. Condensate drain pan shall be furnished with threaded pipe connections and shall extend completely under the coil section. Internal insulation shall be wrapped waterproof and of rigid closed-cell polyurethane. Insulated copper piping is to be used for condensate drain lines.
- 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.

### 3. EXHAUST FANS

- a. Bathroom Exhauster: Provide bathroom exhauster, designed for ceiling mounting, of type, size, and capacity as shown in Equipment Schedule. Fans shall be as manufactured by Cook, Carnes, Broan, Nutone, or Penn.
- b. Provide HVI (Home Ventilating Institute) Certified Ratings Seal. Provide galvanized steel housing with fan impeller directly connected to motor, and removable as unit from housing for service. Provide integral backdraft damper in fan discharge. Provide stainless steel louvered grille with flange on intake with thumbscrew attachment to fan housing. Provide permanent split-capacitor motor, permanently lubricated, with grounded cord and plug. Provide junction boxes for electrical connection on housing, and receptacle for motor plug-in.

### 4. PIPE PENETRATIONS

- a. Pipe penetrations through floor slabs and fire rated walls shall be restored to the slab or fire rated wall's original rating and shall be sealed with impervious noncombustible materials sufficiently tight to prevent transfer of smoke or combustion gases from one side of the wall or slab to the other in accordance with UL methods.
- b. As appropriate to the penetration size and location, provide firestopping using one of the following:

High-temperature non-shrink grout shall be installed in accordance with recommendations of ACI, CSI and the manufacturer's specifications.

Fill openings with Thermofiber Safing insulation.

Caulk full depth of wall or floor with 3M-fire barrier material - No. 25 caulk or 303 putty.

- c. Penetrations through construction shall be neatly drilled or cut, and the opening completely filled around the penetrating pipe with the approved firestopping material. Solid masonry and concrete walls as well as concrete slabs shall be core drilled. Diameter of core drilled holes shall be from 3/4 inch to 1-1/2 inch bigger than the outside diameter of pipe. Pipe shall be secured within 18 inches of the penetration, both sides, from other than the firewall or slab itself.

#### 5. SHEET METAL WORK

- a. Provide all ducts, dampers and accessories as indicated on the drawings and specified herein.
- b. Duct sizes shown on drawings are actual sheet metal sizes. Plans are generally diagrammatic and Contractor shall make take offs as required to install ducts in spaces provided, however, the Contractor shall secure the Owner's approval before re-routing or changing duct sizes.
- c. Sheet metal work shall be constructed in accordance to S MACNA, Inc. Low Velocity Duct Construction Standards.
- d. Dampers, volume (Manual). Provide the manually operated volume control dampers necessary for the proper balancing of the air handling system. They shall have an indicating device with lock to hold the damper in position for proper setting. Wye branch connections to have splitter dampers. All branch ducts to registers shall have a damper.
- e. Ductwork: All low velocity ductwork shall be constructed of galvanized steel in accordance with Table 1 and Plates 5 through 15 of the low velocity duct standard. Galvanized steel shall be of lock forming quality and shall have a galvanized coating of 1 1/4 ounces total for both sides of one (1) square foot of a sheet.
- f. Flexible ductwork: All flexible ductwork within the building envelope shall have a minimum R-value of 6.2. All flexible ductwork outside of the building envelope shall have a minimum R-value of 8.0.
- g. Elbows, Radius: Shall be constructed in accordance with Plate 21, Figure B of the low velocity duct standard.

#### 6. GRILLES

- a. The diffuser, grilles, and registers shall be of type and size shown in the equipment schedule. A white finish shall be provide, unless noted otherwise. Provide with volume control dampers, square-to-round transitions, etc.
- b. Use Carnes, J & J, Metal-Aire, or approved equivalent.

#### 7. INSULATION



- a. Duct Insulation
  - i. All supply, return, and outside air intake duct shall be wrapped with 2" thick 1lb/sf density fiberglass wrap with reinforced aluminum foil vapor barner. Use Owens-Corning or equal.
  - ii. In addition to ductwrap, all low pressure supply and return ductwork shall be lined for 15 feet downstream from air handling unit with Schuller Permocote Linacoustic Hp or approved equivalent.
  - iii. Ductwrap on ductwork outside of the building envelope shall have a minimum R-value of 8.0

### C. EXECUTION

1. ELECTRICAL CONNECTION OF EQUIPMENT
  - a. Wiring from disconnect switches, junction boxes, panel board circuit breakers, etc. up to mechanical equipment shall be by the electrical contractor. Final electrical connections to mechanical equipment shall be by this contractor.
  - b. Control wiring and control connections control for heating and air conditioning systems is by this Contractor.
2. Tests shall be made on all equipment and apparatus furnished under this contract for verification of performance of equipment and systems.
  - a. 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.
  - b. Operating conditions of all controls and major components shall be verified in the presence of the Engineer and the Owner's representative.
  - c. 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.
  - d. 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).
  - e. All necessary equipment, forms, reports, etc. required to perform the system testing and balancing shall be as recommended in the above named procedures.
  - f. 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.
  - g. 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.

- h. A copy of the approved final balancing data should be included in the Maintenance and Operations Manuals.
- i. After testing, all adjustable pitch motor pulleys shall be replaced with fixed pitch pulleys.

### 3. PAINTING

- a. Contractor shall paint all iron and steel not having a factory finish or galvanized finish used for support and hanging equipment throughout building. One coat of primer shall be used followed by one coat of oil base paint with colors selected by the Owner.
- b. All painted equipment with damaged areas be painted to match original finish.

### 4. CLEAN-UP

- a. At the completion of all work, this Contractor shall be responsible for cleaning up all rubbish, leaving the system in perfect operating condition. He shall further clean up rubbish daily in such a manner that the job shall present a neat appearance. Work shall be accomplished to the satisfaction of the Owner.

### 5. MAINTENANCE AND OPERATING MANUALS

- a. At the completion of this project the Contractor shall furnish the Owner three (3) operating and maintenance manuals containing a brief description of each system and its various components. Instructions must give full details of the operation of all equipment installed, and shall include manufacturer's printed operating and maintenance instructions, detailed data and bulletins covering all material furnished under the contract giving all necessary illustrations and diagrams and a composite schedule of periodic servicing and lubrication requirements and replacement parts.

### 6. AS BUILT DRAWINGS

- a. Contractor shall keep and maintain in good order a record of any deviations from drawings for any reason. This record shall be made available to the Owner on the date of substantial completion and shall be legible and accurate so as to be transferable to as-built reproducible drawing.

### 7. GUARANTEE

- a. The Contractor shall deliver the system to the Owner complete in first-class operating condition in every respect and shall guarantee the material and workmanship for a period of one year from the date of acceptance. If during that time any defect should show up due to defective material, negligence, or want of proper care on the part of the Contractor, he shall furnish such new materials as are necessary to repair such defects and place same in working order at his own expense on receipt of notice of such from the Owner.

END OF SECTION 230000

**SECTION 26 00 00 - ELECTRICAL REQUIREMENTS****PART 1 GENERAL****1.1 General Notes:**

- A. Drawings, all Contract Documents, and Division-1 Specifications sections, apply to work of this section.
- B. Where the term "Contractor" is used, it shall mean the Electrical Contractor.
- C. Contractors bidding on this section must possess a State of North Carolina Electrical Contractor's License. Each bidder shall show his license proposal.
- D. Reference shall be made to the Architectural, Structural, Plumbing and HVAC drawings and specifications for details of building construction and for coordination with other parts of construction.
- E. Contractor shall visit the job site before the submission of a bid and familiarize himself with existing conditions. Submission of a bid will be considered as evidence that the Contractor has visited the site and is familiar with existing conditions.

**1.2 Bidding:**

The Electrical work shall be included under the General Contract.

**1.3 Scope:**

- A. The work under this section of the specifications consists of providing all labor, equipment, supplies, and materials, and performing all operations, including trenching, backfilling, compaction, cutting, channeling and chasing necessary for the installation of a complete wiring system in strict accordance with this section of the specifications and the applicable drawings and subject to the terms and conditions of the contract.
- B. The following gives a brief outline of the Electrical work which is further described in the body of the specifications and indicated on the accompanying drawings:
  - Electrical panel, and disconnect switches.
  - Feeder conduits, conductors, and fittings as shown and specified.
  - Lighting fixtures and lamps.
  - Communication outlets (Data, Telephone and MATV).
  - All power and lighting branch conduit, conductors, outlets, boxes, receptacles, switches and circuit breakers as shown and specified.

- Electrical power connections complete to all equipment requiring electrical connections.
  - Grounding
  - Standby natural gas generator and automatic transfer switch.
- C. Certified manufacturer's drawings and shop drawings shall be submitted for all equipment except the following for which lists of manufacturers and catalog numbers shall be submitted. Submit five (5) sets.
- Conduit
  - Conduit fitting
  - Wiring devices
  - Wire
  - Boxes

**1.4 Applicable Specifications and Standards:** The following standards shall be considered as minimum requirements for this project:

- The National Electrical Code.
- The National Electrical Safety Code.
- The North Carolina State Building Code.
- The Underwriter's Laboratories, Inc.
- The National Electrical Manufacturers Association.
- The Insulated Power Cable Engineers Association.

**1.5 Drawings and Specifications:**

- A. The drawings accompanying these specifications and subsequent drawings or detail will form a part of the contract for this work.
- B. The drawings are diagrammatic and indicate the extent and general arrangement of the outlets and equipment. These drawings shall be followed as closely as possible, but all measurements shall be verified at the job site. Do not scale drawings for location dimensions. Consult the architectural, structural, mechanical, plumbing and equipment drawings and details for this project for exact location of equipment and before starting the work.

- C. The drawings and specifications are supplementary, one to the other, and material and workmanship indicated, called for or implied by the one and not be the other shall be supplied and installed as if specifically called for by both.
- D. Omission of particular reference to any item necessary for a complete installation and proper operation thereof, shall not relieve the Contractor of the responsibility of furnishing same.
- E. Discrepancies shown on different drawings, between drawings and specifications or between plans and field conditions shall be promptly brought to the attention of the Engineer for a decision.

#### **1.6 Codes, Permits and Inspections:**

- A. The entire installation shall comply with:
  - All laws and ordinances applying to electrical installations.
  - The requirements of the National Electrical Code (latest edition with applicable revisions) where such requirements do not conflict with the laws in effect.
  - The regulations of the power company furnishing the electrical service.
  - In the event of conflict between these codes, requirements, etc., the most stringent shall apply.
- B. The Contractor shall give all required notices, obtain necessary permits, and pay all required fees.
- C. After completion of the work, the Contractor shall furnish to the Owner a certificate of final inspection and approval from the electrical inspection department having jurisdiction.

#### **1.7 Singular:**

In all cases where a device or piece of equipment is referred to herein or on the drawings in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installation.

#### **1.8 Use of the Word "Provide":**

Herein, where the work "Provide" is written in these specifications, provide shall be understood to mean provide complete in place, that is, "Furnish and Install".

#### **1.9 Electric Service:**

- A. Voltage: Refer to electrical plans.

**1.10 Equipment and Materials:**

- A. Catalog numbers and trade names in these specifications and noted on the drawings are intended to describe the material, devices or apparatus wanted. Similar materials, devices or apparatus of other manufacturers, if of equivalent quality, capacity and character, may be substituted on the written approval of the engineer. Proposed substitutions with descriptive data shall be submitted to the engineer at least ten days before the Bid Date. The submissions, if approved by the engineer, will be issued in an addendum before the Bid Opening. If the Contractor fails to comply with the provisions of this paragraph, he shall be required to furnish all materials and equipment as specified.
- B. All materials shall be new and shall bear the manufacturer's name, trade name and the UL label in every case where a standard has been established for the particular material. The equipment to be furnished shall be essentially the standard product of a manufacturer regularly engaged in the production of the required type of equipment and shall be the manufacturer's latest approved design.
- C. Equipment and materials shall be delivered to the site and stored in original containers, suitably sheltered from the elements but readily accessible for inspection until installed.
- D. Equipment and materials of the same general type shall be of the same make throughout the work to provide uniform appearance, operation and maintenance.
- E. Equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury and theft. Damage or defects developing before acceptance of the work shall be made good at the Contractor's expense.
- F. Dimensions: It shall be the responsibility of the Contractor to insure that items to be furnished fit the space available. He shall make necessary field measurements to ascertain space requirements, including those for connections, and shall furnish and install such sizes and shapes of equipment that the final installation shall suit the true intent and meaning of the drawings and specifications.

**1.11 Workmanship:**

- A. All work specified herein shall be executed in the best and most workmanlike manner by skilled mechanics. This Contractor shall cover and protect all work and materials throughout the course of the work. He shall be responsible for all damage done to, or caused by, this work until the building is completed and accepted by the Owner, and at completion shall leave the work clean.
- B. This Contractor shall cooperate with all other contractors on the project and shall prosecute the work as fast as the progress of other work will allow. He shall consult with the other trades and be responsible for the proper placing and fitting of this work in advance of, or in connection with other work.

**1.12 Modifications:**

- A. Instructions that will modify the work will be ordered by the engineer in writing either before or after the signing of the contract. Only such instructions shall be accepted by this Contractor.
- B. Slight relocations of outlets, devices and equipment shall be made by this Contractor as required, at no additional cost to the Owner, for proper coordination of all trades.

**1.13 Locations and Measurements:**

- A. Outlets, devices, fixtures and appliances have been located and shown as accurately as possible on the drawings. The Contractor shall take necessary measurements in the field for exact locations and match his work to the building construction. The outlets for special appliances must be installed so they will be in the proper location when the appliances are installed. Necessary information for the proper installation of these special outlets shall be obtained from the Owner by a request in writing.
- B. This Contractor shall furnish and place all metal sleeves necessary for electrical work at the time of or prior to building of the walls or pouring of slabs. He shall be responsible for the locations and sizes of these sleeves. The Contractor shall furnish and install all inserts and hangers required to support conduits, cables, pull boxes, etc. If the sleeves, hangers, inserts, etc. are improperly installed, this Contractor shall do all necessary cutting and patching at his own expense to rectify the errors.

**1.14 Excavation and Backfill:**

This Contractor shall do all excavation necessary for the installation of this work and shall backfill such excavation promptly. Backfill shall be thoroughly tamped with mechanical tamper in layers not exceeding six (6) inches. Rocks and rubbish are prohibited from trenches.

**1.15 Cutting, Patching, and Repairing:**

- A. In new construction, the General Contractor will provide all openings in wall, floor and roof construction required by Electrical Contractor for installation of his work, provided complete information is furnished to the General Contractor at the time required. Failure to provide necessary information will necessitate provisions of additional required openings, chases, recesses, etc., by this Contractor at his own expense, and he shall be fully responsible for the proper cutting and patching of such construction as approved and directed by the engineer.
- B. Where pipes or conduit pass through walls, floors, or roofs, sleeves shall be furnished by this Contractor and installed, except as noted otherwise, by the trade furnishing and installing the material in which they are located. Location of sleeves, inserts, and supports shall be as directed by this Contractor who will also insure that they are properly installed. Sleeves shall be neatly sawed, sheared, or cut with wheeled cutters. No flame cutting will be permitted.

- C. Each trade shall bear the expense of all cutting, patching, repairing or replacing of the work of other trades required because of his fault, error or tardiness or because of any damage done by him.
- D. Under no circumstances shall the Contractor cut any structural beam or support without prior approval and instructions from the Owner.
- E. If Electrical Contractor installs electrical work through exposed finish walls, ceiling or floor after they are in place, the Electrical Contractor shall close excess openings around his work to match finish surfaces.

## PART 2 PRODUCTS

### 2.1 Lighting Fixtures and Lamps:

- A. Catalog number and names of manufacturers are used to convey the types, performance and quality of fixtures to be supplied. Fixtures of other manufacturers may be acceptable provided they offer equal or superior performance and quality and are approved as substitutions. Approval of substitutions 10 days prior to Bid date required.
- B. Catalog numbers given are not necessarily the total fixture specifications. The general description, type and number of lamps, pertinent details as to the quality and functional operation of the fixture as well as the catalog numbers are to be considered in determining the appearance, performance and quality intended. Any major discrepancies in any particular fixture specification should be reported to the engineer prior to submitting a proposal.
- C. It is intended that a lighting fixture be provided for every lighting outlet shown. Any omission is in error and shall be brought to the attention of the engineer prior to submitting a proposal; otherwise the fixture of intent selected by the engineer shall be furnished and installed at no additional cost to the contract.
- D. 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. Fixtures shall be dimmable down to 10% minimum with standard 120 volt, electronic, low voltage dimmers **unless otherwise specified on plan.**
  - 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 with the exception of high bay fixtures, optical design.



- 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.
- E. Refer to drawings for fixture schedule.

## 2.2 Materials and Equipment:

- A. All materials used in this work shall be new and listed by the Underwriter's Laboratories, Inc. in every case where a standard has been established for the particular type of the material to be installed. Materials and equipment furnished under this specification shall be the standard products of manufacturers regularly engaged in the manufacture of such equipment and shall be identical.
- B. Electrical Metallic Tubing/Rigid steel conduit: General Electric Electro Galvanized Zinc-Coating.
- C. EMT Fittings: Thomas & Betts - compression type or approved equal.
- D. Rigid Fittings: Thread type.
- E. Flexible Conduit: Liquid-tight flexible conduit shall be "Sealtight" type UA as manufactured by American Brass or approved equal.
- F. PVC Conduit: Type 40, heavy wall rigid.
- G. Insulated Bushings: Rigid conduit - 0-Z Type "A". EMT - Thomas & Betts - "Blue Throat" plastic insulated series or approved equal.
- H. Insulated Grounding Bushing: 0-Z Type "B" or approved equal.
- I. Pull and Junction Boxes: Pull boxes shall be fabricated from galvanized sheet steel, not less than 16 gauge thick, with covers held in place by corrosion-resistant machine screws. Boxes shall be furnished and installed where indicated on the plans or where necessary to facilitate cable pulling and splicing. Box size shall be as required by N.E.C. for the number of conduits and conductors entering and leaving it. Where feeder splices are to be made, box shall be large enough to provide ample work space. Exposed boxes shall not have extra knockouts.
- J. Outlet Boxes: All outlet boxes shall be galvanized steel, at least 2-1/8" deep and of sufficient size to accommodate devices noted. Boxes for fixtures shall have fixture studs in the center. If flexible connections are to be made, use "Greenfield" with appropriate fittings for ground continuity. Outlet boxes, for wiring devices in finished walls, shall be one-piece, standard, gang-type, of a size to accommodate number of devices noted.

Boxes shall have tile rings to bring box openings flush with finished wall or not more than 1/16" back of same. Sheet steel boxes shall be as manufactured by Steel City, Raco, Appleton, Kilark, or approved equal. Exposed boxes shall not have extra knockouts.

- K. Wiring devices shall per the symbol legend on the plans. Equivalent wiring devices shall be as manufactured by Hubbell, P&S and Leviton. Wiring device trim plates shall be as noted on the plans. See plan for additional information.
- L. Wire and Cable:
- All wiring shall be of copper. Provide the AWG size shown on the drawings with insulation indicated below. Wiring for wet locations shall use conductor insulation rated for that use.
  - Conductors shall conform to latest NEC requirements and meet ASTM specifications. Conductors shall be stranded except that sizes No. 10 and smaller shall be solid.
  - Wire size, voltage rating, insulation type and manufacturer shall be clearly marked on the conductor jacket at regular intervals. Conductors with the following types of insulation shall be installed in locations indicated and/or shown on drawings. Conductors and cables shall be as manufactured by Senator Wire and Cable Co., Southwire Company, or the Okonite Co.
  - Type THHN, or THWN-2 for No. 10 and smaller branch circuits. (Circuits of 600 volts or less.)
  - Type THHN or THWN-2 for No. 8 and larger. (Circuits of 600 volts or less.)
- M. Wire Connectors: Pressure connectors as manufactured by "O-Z" or Thomas and Betts for feeders; and wire nuts by Ideal Industries or "Scotch Lox" by Minnesota-Mining for branch circuits or approved equal.
- N. Panelboards:
- All breakers shall be bolt-on type. Breakers shall be thermal magnetic tripped and shall have interrupting capacities required on the drawings. Panelboard shall have asymmetrical fault current rating equal to or greater than panels specified on drawings.
  - Panelboards shall be provided with size and number of breakers as indicated on plans. Main breakers, where required, shall be top or bottom mounted. Side mounted main breakers or those occupying space which will limit panelboard construction to less than 42 branch circuit poles are precluded.
  - Single pole breakers for lighting circuit, only, may be quick lag type, equipped with one operating handle, molded in one common case. External connections with internal trip devices for ganging quick lag breakers will not be permitted. All breakers to be thermal magnetic, temperature compensated type and shall be quick-make, quick-break type for

manual and automatic operation. When panels are used for switching, breakers shall be specifically approved by Under-writers' Laboratory for such operation.

- Conductors in panelboards shall be grouped together and laced with plastic ties in a neat, substantial and approved manner.
  - A neatly typed directory, properly identifying each circuit, shall be installed in each panelboard. A temporary running directory shall be maintained during construction.
  - Branch circuits shall be connected in each panel board as indicated on drawings.
  - All panels shall be marked with its designation and voltage by installing engraved plastic plates with pop rivets. Pressure sensitive plastic tape will not be permitted. Submit sample for approval.
  - Panels shall be Square D or equivalent by ABB, Siemens, or Eaton. Refer to panel diagrams for required features.
- O. Disconnects:
- Disconnects shall be furnished and installed at locations shown on plans. Refer to schedule on drawings for additional requirements. Disconnects shall be equipped with fusible poles, as indicated, with quick-break operating mechanism. All disconnects shall be equipped with full-cover interlock.
  - All disconnects shall be provided with provisions for locking of handle in either "on" or "off" position by installation of pad lock as required. All disconnects shall be equipped with positive pressure fuse clips and shall have visible disconnecting blade switches. Disconnects to be furnished with factory-finished paint with appropriate knockouts for conduit connections.
  - All disconnects shall be Square D heavy duty, or equivalent by ABB, Siemens, or Eaton.
  - Fusetron, or equal, dual-element fuses shall be used for protection of motor driven equipment.

### **PART 3 EXECUTION**

#### **3.1 Wiring Methods:** Wiring methods shall be:

- A. Rigid Schedule 40 PVC for underground secondary service.
- B. Electrical metallic tubing or MC cable for all systems run above floor.
- C. Liquid-tight flexible conduit for short equipment connections and connections to motors or motor equipment.

- D. Rigid PVC conduit for all systems run under floor or underground.

### 3.2 Installation Methods:

- A. The installation shall comply with the latest issue of all national, state and local rules and ordinances. The requirements of the latest issue of the National Electrical Code shall be considered a minimum. The state and/or local requirements or the plans and/or specifications shall govern when they exceed the requirements of the National Electrical Code.
- B. All work shall be concealed in walls, partitions, ceilings, and floors unless specifically indicated as being exposed. All conduits run overhead shall be run tight to bottom of joists.
- C. In places where walls are masonry, conduits and boxes shall be installed in the walls as they are erected. Boxes shall be of such depth that conduit entrances may be made without excessive cutting of the masonry. Box openings shall be cut neatly to fit the outline of the boxes and the finish plates shall cover the entire cut opening.
- D. Contractor is prohibited from installing electrical rough-ins in the air cavity **between brick veneer and underlying wall**. In the case that the electrical rough-in serves an exterior wall mounted device, the conduit must exit the underlying wall directly behind the device it serves.
- E. Exposed conduit shall be installed with runs parallel or perpendicular to walls and ceilings with right angle turns utilizing outlet boxes or symmetrical bends.
- F. Conduit installed underground shall have a minimum cover of two (2) feet. Joints in conduit installed underground or under floor shall be made watertight. Conduit under concrete floor slab shall be installed on top of subgrade before stone fill is placed.
- G. Exposed conduits shall be securely fastened in place no more than six (6) feet centers for up through one (1) inch and eight (8) feet for all sizes larger than one (1) inch and hangers, supports or fastenings shall be provided at each elbow and at the end of each straight run terminating at a box or cabinet. Horizontal and vertical conduit runs may be supported by one-hole malleable straps, clamp backs, or other approved device with suitable bolts, expansion shields where needed or beam clamps for mounting to building structure or special brackets. Adjustable hangers may be used to suspend conduits when separately located. Hangers shall be made of durable materials suitable for the application involved.
- H. Conduit ends shall be cut square, threaded and reamed to remove burrs and sharp edges. Field threads shall be of same type and have same effective length as factory cut threads. Conduit joints shall be made with approved couplings. Bends and offsets shall be avoided where possible, but where necessary factory elbows shall be used for one (1) inch and larger. Other offsets and bends shall be made with an approved hickey or conduit bending machine. Conduit deformed or crushed in any way shall not be installed and bends with a radius of less than 3-1/2 inches will not be permitted.

- I. Conduit shall be securely fastened to all sheet metal outlet, junction, cabinets and pull boxes with double galvanized locknuts and insulated bushings, care being observed to see that the full number of threads project through to permit the bushing to be drawn tight against the end of conduit, after the locknuts shall have been made up sufficiently tight to draw them into firm electrical contact with the box. Insulated bushings of fiber or plastic shall be used on one (1) inch conduit and larger.
- J. During installation, conduit ends shall be capped or plugged to prevent the entrance of foreign matter. The Contractor shall exercise necessary precautions to prevent accumulation of water, dirt or concrete in the conduits during execution of the work. Conduits in which water or other foreign materials have been permitted to accumulate shall be cleaned thoroughly or the conduit run replaced where such accumulation cannot be removed by methods approved by the engineer.
- K. No wires shall be installed until work which might cause damage to the wires or conduits has been completed. Conductors terminating at wired outlets shall extend at least eight (8) inches beyond the outlet to facilitate installation of wiring devices or fixtures.
- L. All taps, splices, and joints for conductor's size number eight (8) and larger shall be made by mechanical means. Connectors used shall have Underwriter's Laboratories approval for use at six hundred (600) volts. All conductors size number ten (10) and smaller shall be jointed by non-corrosive flux solder connections using the hot dip method except that ideal "wirenuts" or approved equal, as for example, 3M preinsulated (plastic covered) "Scotchlox", shall be used to connect fixture lead wires to their designated branch circuit in junction boxes. These splices shall be electrically and mechanically secure and installed equal to or exceeding the conductor capacity in each instance. All joints, splices, and taps and other sections or wiring requiring taping shall be taped with at least two (2) layers of approved gum rubber tape which shall be laid on with half lap followed by at least one (1) layer of friction of or plastic tape laid on with half lap. The intent of this specification is that the taping shall be neatly done and form a permanently secured insulation equal to that of the wire.
- M. Minimum wire size for all branch circuits shall be No. 12 AWG.
- N. Minimum size for conduit shall be 1/2 inch.
- O. No wiring will be installed in the telephone conduit. Provide pull wires in each conduit.
- P. Where more than one (1) device is installed at the same location and mounting height, a gang plate shall be used.
- Q. Junction and/or pull boxes shall be furnished and installed where necessary to avoid excessive runs or too many bends between outlets.
- R. Powdered soapstone or approved lubricants shall be used to facilitate pulling conductors into conduit.

- S. The following color code shall be used for all conductors in feeder and branch circuits.

	120/240 V 1P, 3W
Phase	Black
Phase	Red
Neutral	White
Ground	Green

Branch circuit conductors shall be factory color coded. Scotch tape of the proper color may be used to identify conductors No. 4 and larger. All feeders, sub-feeders to panels, motor starters and motors shall be completely phased out as to sequences left to right when facing equipment.

- T. All motors with conduit connections shall be connected to conduit system with short length (not more than twenty-four (24) inches of flexible liquid-tight conduit.)
- U. Circuits are shown schematically. Installation shall be as shown on drawings except by written permission of the engineer.
- V. Conductors shall be continuous from outlet to outlet, and no splices shall be made except within outlet or junction boxes.
- W. Conductors for branch circuits whose length from panel to center of load exceeds fifty feet shall be No. 10 AWG unless a larger size is shown on drawings.
- X. All receptacles to be grounded to the raceway system with a No.12 green TW jumper connected to the bonding screw. Steel City Style G, grounding clips may be used on stamped steel boxes. Bonding jumper shall be installed as the device box is installed.
- Y. A code gauge, green grounding conductor, (considered a non-current-carrying conductor), shall be pulled through the entire raceway system.
- Z. PVC conduit shall be UL labeled, shall be rated for 90 degrees C. wiring, and shall be assembled with solvent weld fittings. Bends shall be accomplished with equipment specifically intended for the purpose, and flame-type heating devices shall not be used. Any portion of the conduit, which has been scorched or deformed because of excessive heat, shall be rejected. PVC conduits shall not be run exposed in any locations.

**3.3 Electrical Connection of Equipment:**

- A. Electrical Contractor shall make power connections to all owner supplied equipment. Refer to detail on plans for connections to mechanical and plumbing equipment.
- B. Control wiring for Heating and Air Conditioning Systems is by Heating and Air Conditioning Contractor.

**3.4 Electrical Identification**

- A. Furnish and install engraved laminated phenolic nameplates for all safety switches, panel boards, transformers, switchboards, motor control centers and other electrical equipment supplied for the project for identification. Nameplates shall be securely attached to equipment with self-tapping stainless-steel screws; if the screw sharp end is protected; otherwise Rivets shall be used. Letters shall be approximately 1/2-inch-high minimum. Embossed, self-adhesive plastic tape is not acceptable for marking equipment. Nameplate material colors shall be:
- Blue surface with white core for 120/240-volt equipment.
  - Orange surface with white core for all equipment related to telephone systems.
  - Brown surface with white core for all equipment related to data systems.
- B. Furnish and install self-adhesive plastic tape for all receptacle and wall switch cover plates indicating circuit numbers.
- C. 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.

### **3.5 Painting:**

- A. Contractor shall paint all iron and steel not having a factory finish or galvanized finish used for support and hanging equipment throughout building. One coat of primer shall be used followed by one coat of oil base paint with colors selected by the Owner.
- B. All painted equipment with damaged areas shall be painted to match original finish.

### **3.6 Clean-Up:**

At the completion of all work, this Contractor shall be responsible for cleaning up all rubbish, leaving the system in perfect operating condition. He shall further clean up rubbish daily in such a manner that the job shall present a neat appearance. Work shall be accomplished to the satisfaction of the engineer.

### **3.7 Maintenance and Operating Manuals:**

At the completion of this project the Contractor shall furnish the Owner three (3) operating and maintenance manuals containing a brief description of each system and its various components. Instructions must give full details of the operation of all equipment installed, and shall include manufacturer's printed operating and maintenance instructions, detailed data and bulletins covering all material furnished under the contract giving all necessary illustrations and diagrams and a composite schedule of periodic servicing and lubrication requirements and replacement parts.

### **3.8 As Built Drawings:**

Contractor shall keep and maintain in good order a record of any deviations from drawings for any reason. This record shall be made available to the Owner on the date of substantial completion and shall be legible and accurate so as to be transferable to as-built reproducible drawing.

**3.9 Guarantee:**

The Contractor shall deliver the system to the Owner complete in first-class operating condition in every respect and shall guarantee the material and workmanship for a period of one year from the date of acceptance. If during that time any defect should show up due to defective material, negligence, or want of proper care on the part of the Contractor, he shall furnish such new materials as are necessary to repair such defects and place same in working order at his own expense on receipt of notice of such from the Owner.

**END OF SECTION 26 00 00**



**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>)).

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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.

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**PART 2 PRODUCTS**

**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.

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**PART 3 EXECUTION**

**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>)).

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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.

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**PART 5 PRODUCTS**

**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.

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- 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.

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**PART 9 EXECUTION**

**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.

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- 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**

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**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.

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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.

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- 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.

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**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.



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- 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**

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## 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).

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- 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.

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- 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.

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- 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:

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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.

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**PART 17 PRODUCTS**

**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.

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- 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.

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- 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:

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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.

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- 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.

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- 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.



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- 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**

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## 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.

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- 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.
  
- C. Test Reports: Indicate certified tests results for precast concrete at manufacturing facility, cast-in-place concrete in-field and granular backfill, as applies.

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- 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.

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**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.

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- 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



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- 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.

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**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

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- 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.

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- 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. Test Reports: Submit termite-resistant sheet manufacturer's summary of independent laboratory and field testing for effectiveness in subterranean termite exclusion.
- E. Manufacturer's Instructions: Indicate caution requirement.
- F. 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.

Division 31 – Earthwork

**PART 26 PRODUCTS**

**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>)).

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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.

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**28.6 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.
  - 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.

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**PART 30 EXECUTION**

**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.

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- 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**

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**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: P reparation 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.

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- 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.



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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.

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- 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.

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**PART 33 EXECUTION**

**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.

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**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.

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- 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**

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**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.

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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.



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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.

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- 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.

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**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.

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**PART 36 EXECUTION**

**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.

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**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.

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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.

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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.



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- 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.
- 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.

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**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 mclds, 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.
  - 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.

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- C. Other Equipment:
  - 1. For application of crosswalks, intersections, stop lines, legends and other miscellaneous items by walk behind stripers, 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.

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**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.
- 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

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- 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.
- 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

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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.

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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.

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Edit material certifications list to suit products specified in this section and Project sustainable design requirements. Specific certificate submittal and supporting data requirements are specified in Section 01 81 13.

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- 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.

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- 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.

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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.

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**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 ¼-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.
  
- B. National Electrical Manufacturers Association:

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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.

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- 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.
- 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.

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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
- B. Ball Valves: Bronze construction, inside screw with threaded ends.
- C. Backflow Preventers: Brass body construction, reduced pressure zone (RPZ) type.



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- 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.

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- 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.

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**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**

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**SECTION 32 91 13**  
**SOIL PREPARATION**

**PART 46 GENERAL**

**46.1 SUMMARY**

- A. Section Includes:
  - 1. Preparation of subsoil.
  - 2. Soil tesing.
  - 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.

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**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.

**47.2 ACCESSORIES**

- A. Edging: Galvanized steel.

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**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.
- E. Install edging at periphery of seeded areas in straight lines to consistent depth.

**END OF SECTION**

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**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.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

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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.

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**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**

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## 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 Substantial 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

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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.



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**PART 54 EXECUTION**

**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.

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**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, 3 inch top soil.
- B. Rear Seeded Area: Grass seed mixture specified except substitute Clover for Kentucky Blue Grass, 2 inch top soil.

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**END OF SECTION**

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## 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.
- D. Deliver plant life materials immediately prior to placement. Keep plants moist.

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- 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.

**PART 59 PRODUCTS**

**59.1 TREES, PLANTS, AND GROUND COVER**



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- 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.

**59.5 ACCESSORIES**

- A. Wrapping Materials: Burlap.
- B. Stakes: Softwood lumber, pointed end.

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- 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**

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- 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.
- 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.

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**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.

**60.11 SCHEDULE**

- A. Plant Schedule:  
  
See Civil Drawings for Plant Schedule.

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**END OF SECTION**

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## 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.

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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.



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- 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.

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**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.

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**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.

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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.

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## 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.

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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.

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- 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.



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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.

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**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.

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**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

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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.

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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.

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- 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**

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## 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.

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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:

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- 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.

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## 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.

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**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.

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**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.

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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.



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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..

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**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.

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**PART 71 PRODUCTS**

**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.

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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] \*\*\*\*\*

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- 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.

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- 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.

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**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.

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**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.

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- 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.

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- 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.

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- 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].

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**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:

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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.

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**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.



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**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**

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## 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.

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- 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.

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- 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] \*\*\*\*\*

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- 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

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**PART 78 EXECUTION**

**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] \*\*\*\*\*

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- 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.

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- 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.

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**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.

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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.

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- 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**

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## 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.

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## **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.



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**PART 84 EXECUTION**

**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**

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**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.

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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</sup>)).
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</sup>)).
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.

**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.

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- 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.

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- 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.

**87.3 BEDDING**

- A. Excavate pipe trench in accordance with Section 31 23 17.

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- 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.

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- 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:

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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.

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- 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.

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## **88.9 COORDINATION**

- 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.

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**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.

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- 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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## 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.

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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</sup>)).
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</sup>)).
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).

**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.

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- 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

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**PART 93 EXECUTION**

**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.

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**93.5 PIPE ENDS**

- 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**

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## **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.

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- 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.



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- 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.

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- 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**