



**City of Concord  
J.E. "Jim" Ramseur Park**

**PROJECT MANUAL  
Volume 1  
February 6, 2025 Issued for Bid**

**City of Concord  
Engineering Department  
P.O. Box 308  
Concord, NC 28026**

**PROJECT No. 2022-080  
BID No. 2590**



**WOOLPERT**

ARCHITECTURE | ENGINEERING | GEOSPATIAL

WOOLPERT OF NORTH CAROLINA, PLLC

13860 BALLANTYNE CORPORATE PLACE

SUITE 425

CHARLOTTE, NC 28277

SECTION 000103 - PROJECT DIRECTORY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Identification of project team members and their contact information.

1.2 OWNER:

- A. Name: City of Concord

- 1. Address Line 1: 147 Academy Avenue, NW
- 2. Address Line 2: P.O. Box 308
- 3. City: Concord
- 4. State: North Carolina
- 5. Zip Code: 28026
- 6. Telephone: (704) 920-5600

- B. Primary Contact: All correspondence from the Contractor to the Architect will be through this party, unless alternate arrangements are mutually agreed upon at preconstruction meeting.

- 1. Title: Senior Planner – Greenways & Parks
- 2. Name: George Berger, AICP
- 3. Email: [bergerg@concordnc.gov](mailto:bergerg@concordnc.gov)

1.3 CONSULTANTS:

- A. Architect: Design Professional of Record. All correspondence from the Contractor regarding construction documents authored by Architect's consultants will be through this party, unless alternate arrangements are mutually agreed upon at preconstruction meeting.

- 1. Company Name: Woolpert of North Carolina, PLLC
  - a. Address Line 1: 13860 Ballantyne Corporate Place, Suite 425
  - b. City: Charlotte
  - c. State: North Carolina
  - d. Zip Code: 28277
  - e. Telephone: (704) 525-6284



2. Primary Contact:
    - a. Title: Project Manager
    - b. Name: David Welling, AIA, CCCA, LEED
    - c. Email: [david.welling@woolpert.com](mailto:david.welling@woolpert.com)
    - d. Telephone: (704) 526-3130
  3. Alternate Contact:
    - a. Title: Project Architect
    - b. Name: Trevor Horst
    - c. Email: [trevor.horst@woolpert.com](mailto:trevor.horst@woolpert.com)
- B. Civil Engineering:
1. Company Name: Woolpert of North Carolina, PLLC
    - a. Address Line 1: 13860 Ballantyne Corporate Place, Suite 425
    - b. City: Charlotte
    - c. State: North Carolina
    - d. Zip Code: 28277
    - e. Telephone: (704) 525-6284
  2. Primary Contact:
    - a. Title: Team Leader, Civil Engineer
    - b. Name: Ray Nix, Jr., PE
    - c. Email: [ray.nix@woolpert.com](mailto:ray.nix@woolpert.com)
    - d. Telephone: (843) 972-4596
- C. Landscape Architecture:
1. Company Name: Woolpert of North Carolina, PLLC
    - a. Address Line 1: 13860 Ballantyne Corporate Place, Suite 425
    - b. City: Charlotte
    - c. State: North Carolina
    - d. Zip Code: 28277

- e. Telephone: (704) 525-6284
- 2. Primary Contact:
  - a. Title: Managing Principal, Landscape Architect
  - b. Name: Andrew Pack, PLA, ASLA
  - c. Email: [andrew.pack@woolpert.com](mailto:andrew.pack@woolpert.com)
  - d. Telephone: (704) 526-3102
- D. Structural Engineering:
  - 1. Company Name: Woolpert of North Carolina, PLLC
    - a. Address Line 1: 13860 Ballantyne Corporate Place, Suite 425
    - b. City: Charlotte
    - c. State: North Carolina
    - d. Zip Code: 28277
    - e. Telephone: (704) 525-6284
  - 2. Primary Contact:
    - a. Title: Team Leader, Structural Engineer
    - b. Name: Mark Mainridge, SE, PE
    - c. Email: [mark.mainridge@woolpert.com](mailto:mark.mainridge@woolpert.com)
    - d. Telephone: (407) 384-1185
- E. Mechanical Engineering Consultant - Plumbing:
  - 1. Company Name: Optima Engineering
    - a. Address Line 1: 1927 South Tryon Street, Suite 300
    - b. City: Charlotte
    - c. State: North Carolina
    - d. Zip Code: 28203
    - e. Telephone: (704) 338-1292
  - 2. Primary Contact:
    - a. Title: Plumbing Engineer

- b. Name: George Fowler, III, PE
- c. Email: [gfwler@optimaengineering.com](mailto:gfwler@optimaengineering.com)

F. Mechanical Engineering Consultant - HVAC:

- 1. Company Name: Optima Engineering
  - a. Address Line 1: 1927 South Tryon Street, Suite 300
  - b. City: Charlotte
  - c. State: North Carolina
  - d. Zip Code: 28203
  - e. Telephone: (704) 338-1292
- 2. Primary Contact:
  - a. Title: Principal, Mechanical Engineer
  - b. Name: Ron Almond, PE
  - c. Email: [ralmond@optimaengineering.com](mailto:ralmond@optimaengineering.com)

G. Electrical Engineering Consultant:

- 1. Company Name: Optima Engineering
  - a. Address Line 1: 1927 South Tryon Street, Suite 300
  - b. City: Charlotte
  - c. State: North Carolina
  - d. Zip Code: 28203
  - e. Telephone: (704) 338-1292
- 2. Primary Contact:
  - a. Title: Project Manager, Electrical Engineer
  - b. Name: Brandon Miller, PE
  - c. Email: [bmiller@optimaengineering.com](mailto:bmiller@optimaengineering.com)

H. Modular Retaining Wall Engineering Consultant:

- 1. Company Name: Terracon
  - a. Address Line 1: 4685 South Ash Avenue, Suite H4

- b. City: Tempe
  - c. State: Arizona
  - d. Zip Code: 85282
  - e. Telephone: (480) 897-8200
2. Primary Contact:
- a. Title: Project Engineer
  - b. Name: Brittany Dalton, PE
  - c. Email: [Brittany.dalton@terracon.com](mailto:Brittany.dalton@terracon.com)

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 000107 - SEALS PAGE

Architectural, Civil, LA, and Structural:  
Woolpert



Bryan D. Fike, AIA, NCARB  
Architect of Record



Ray M. Nix, Jr., PE  
Civil Engineer of Record



Andrew R. Pack, PLA, ASLA  
Landscape Architect of Record



Mark Mainridge, SE, PE  
Structural Engineer of Record

**Aquatic Splashpad Design:  
Schultz Engineering**



George W. Austin JR., PE  
Aquatic Engineer of Record

4-21-23

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013200 Construction Progress Documentation  
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015000 Temporary Facilities and Controls  
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032000 Concrete Reinforcing  
033000 Cast-In-Place Concrete  
033511 Concrete Floor Finishes

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047200 Cast Stone Masonry

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054000 Cold-Formed Metal Framing  
055000 Metal Fabrications  
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074646 Fiber-Cement Wall Panels)  
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079200 Joint Sealants

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088000 Glazing  
089100 Louvers



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095100 Acoustical Ceilings  
096500 Resilient Flooring  
096700 Fluid-Applied Flooring`  
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102113.19 Plastic Toilet Compartments  
102800 Toilet, Bath, and Laundry Accessories  
104400 Fire Protection Specialties

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116800 Play Field Equipment and Structures  
116801 Traditional Playground Equipment  
116802 Adventure Playground Equipment  
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122113 Horizontal Louver Blinds  
123200 Manufactured Wood Casework  
123600 Countertops

DIVISION 13 - SPECIAL CONSTRUCTION

131414 Aquatic Play Equipment

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DIVISION 15 – HVAC (**See Drawings**)

DIVISION 21 - FIRE SUPPRESSION (**Not Applicable**)

DIVISION 22 – PLUMBING (**See Drawings**)

DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) (**See Drawings**)

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312000 Earthwork  
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C-103	DEMOLITION PLAN
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S-101-SP	SPLASHPAD PAVILION - FOUNDATION PLAN
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#### **BASKETBALL RESTROOM (BB)**

S-101-BB	BASKETBALL RESTROOM FOUNDATION AND ROOF FRAMING
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A-201-PB	BUILDING ELEVATIONS
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**SPLASHPAD PAVILION (SP)**

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**BASKETBALL RESTROOM (BB)**

A-100-BB	CODE SUMMARY AND LIFE SAFETY PLAN
A-101-BB	FLOOR PLAN, ROOF PLAN, & RCP
A-201-BB	BUILDING ELEVATIONS & SECTIONS
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**MAINTENANCE BUILDING (MB)**

A-100-MB	CODE SUMMARY AND LIFE SAFETY PLAN
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A-111-MB	REFLECTED CEILING PLAN
A-201-MB	BUILDING ELEVATIONS
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A-101-PS PARK SIGNAGE - PLAN, ELEVATION, & SECTIONS

### **SHELTER PAVILIONS (PV)**

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A-102-PV SMALL PAVILIONS PLANS, ELEVATIONS, & BUILDING SECTION

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### **SPLASHPAD PAVILION (SP)**

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### **BASKETBALL RESTROOM (BB)**

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### **MAINTENANCE BUILDING (MB)**

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END OF SECTION



**BID ADVERTISEMENT/INVITATION TO BID**

**February 6, 2025**

Project Title: **J.E. "JIM" RAMSEUR PARK  
Project No. 2022-080– Bid No. 2590**

Project Description: The Project consists of the demolition of existing site structures and construction of the new J.E. "Jim" Ramseur Park, including, but not limited to, sitework, Cox Mill roadway improvements, park amenities, greenway, shelters, pickleball restroom building, splashpad pavilion/restroom building, basketball restroom building, and a maintenance building. The project includes sitework and vertical construction on the neighboring school property through agreement with the City.

Sealed Bids will be received by the City of Concord (Owner) at the address below. Please submit notarized bids in a sealed envelope by the bid opening time and date. All Bids must be in accordance with the Bidding Documents on file with the City of Concord Engineering Department. Bidders must be licensed contractors in the State of North Carolina. Bids will be received on a unit price basis. A Bid Bond must accompany each bid. The Successful Bidder will be required to furnish a Construction Performance Bond and a Construction Payment Bond as security for the faithful performance and the payment of all bills and obligations arising from the performance of the Contract. Contractor and all Subcontractors will be required to conform to the labor standards set forth in the Contract Documents. Owner reserves the right to reject any or all Bids, including without limitation the rights to reject any or all nonconforming, nonresponsive, unbalanced, or conditional Bids, and will award to lowest responsible Bidder taking into consideration quality, performance, and time specified in Bid Form for performance of Work. Owner also reserves the right to waive informalities.

Enrique A. Blat, PE  
Deputy City Engineer

Engineer: City of Concord Engineering Department  
Alfred M. Brown Operations Center  
635 Alfred Brown Jr Court SW  
P O Box 308, Concord, NC 28026-0308

Contractors wishing to bid on this project must register to bid by sending an email to Noah Shaver at [shavertn@concordnc.gov](mailto:shavertn@concordnc.gov). Registration for bidding requires the name of the company, physical address, email address, and telephone number. All communication regarding this bid will be done through email.

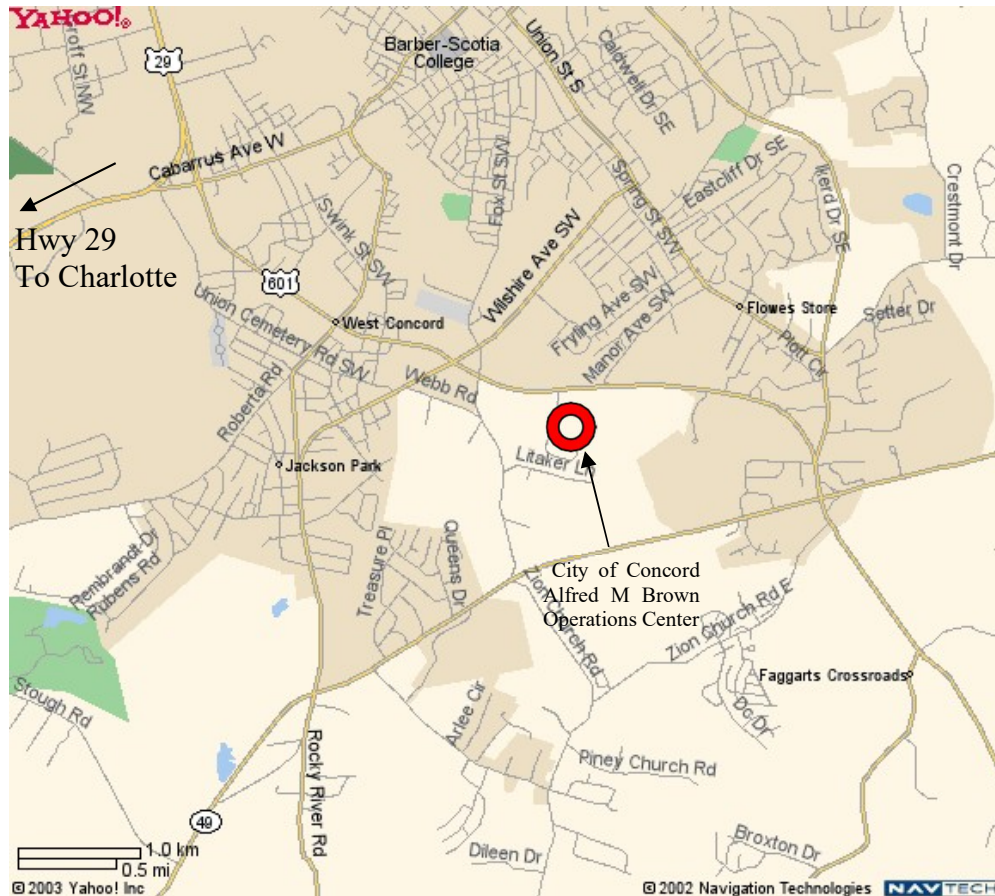
Bid documents are available free of charge from the City of Concord website at: <https://www.concordnc.gov/Departments/Finance/Purchasing/RFPs-and-Bids>

**Technical questions:** Contact Noah Shaver, ([shavertn@concordnc.gov](mailto:shavertn@concordnc.gov))

The City of Concord Engineering Department will hold a **Prebid Meeting for this project on February 27<sup>th</sup>, 2025 at 2:00 PM** in Conference Room C of the Alfred M. Brown Operations Center.

Bid Due Date: **March 20<sup>th</sup>, 2025 at 2:00 PM**  
Location: City of Concord, Alfred M. Brown Operations Center  
635 Alfred Brown Jr Court SW, Concord, NC 28026  
Conference Room C  
(See attached map/directions)

# MAP AND DIRECTIONS TO CITY OF CONCORD ALFRED M BROWN OPERATIONS CENTER



## Directions from Charlotte

Take I-77 north to I-85 north from Charlotte to Concord  
From I-85 north, take exit 49 to the right towards Lowe's Motor Speedway  
At the Lowe's Motor Speedway, turn left onto Highway 29 (Concord Pkwy) north  
Keep going north while you pass the Wal-Mart shopping center on your right  
Turn right at the light at the Chevrolet dealership onto Cabarrus Avenue  
Turn right at the next traffic light at the Walgreens onto Hwy 601 South (bypass)  
(Hwy 601 S is also Warren C. Coleman Boulevard)  
Go straight through two traffic lights at Old Charlotte Road and Wilshire Avenue  
Pass the Golf Driving Range on your right  
Turn right at the next traffic light at Manor Avenue (red & white sign on right  
for the City of Concord Alfred M. Brown Operations Center)  
You will be on the entrance road into our complex  
Follow signs to the left to Visitor Parking.  
Proceed to the front desk at the Administration Building and sign in with the  
Receptionist

## **INSTRUCTIONS TO BIDDERS**

1. **DEFINED TERMS.** Terms used in these Instructions to Bidders are meanings assigned to them in the General Conditions and the Supplementary Conditions. An additional term is defined as follows:

Successful Bidder - The lowest, qualified, responsible, and responsive Bidder to whom Owner (based on Owner's evaluation as herein provided) makes an award.

2. **COPIES OF BID DOCUMENTS.** Bid Documents which include all front-end documents may be obtained from Owner:

City of Concord Engineering Department  
Alfred M. Brown Operations Center  
635 Alfred Brown Jr Court SW  
P O Box 308, Concord, NC 28026-0308 704-920-5425

Bid Documents may be obtained from the Owner via the link below for the City of Concord's website.

### **Complete set of Bid Documents - Free download**

<http://www.concordnc.gov/Departments/Finance/Purchasing/RFPs-and-Bids>

Partial sets of Bid Documents will not be issued in response to requests by subject matter.

Complete sets of Bid Documents must be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misrepresentations resulting from the use of incomplete sets of Quoting Documents.

Owner and Engineer, in making copies of Quoting Documents available on the above terms, do so only for obtaining Bids for the Work and do not confer a license or grant for any other use.

3. **QUALIFICATIONS OF Bidders.** To demonstrate qualifications to perform the Work, Bidder may be required to submit written evidence on financial data, previous experience, present commitments, and other such data as may be requested by Owner or Engineer. Each Bid must contain evidence of Bidder's qualification to do business in the state where the Project is located, or Bidder must agree to obtain such qualification prior to award of the Contract.

**TO BE CONSIDERED AS A BIDDER FOR THIS PROJECT, CONTRACTORS MUST REGISTER WITH THE CITY OF CONCORD BY SENDING AN EMAIL THAT INCLUDES YOUR NAME AND COMPANY CONTACT INFORMATION TO [shavertn@concordnc.gov](mailto:shavertn@concordnc.gov) CONTRACT DOCUMENTS ARE AVAILABLE FROM THE CITY OF CONCORD - WEBSITE**

4. **EXAMINATION OF CONTRACT DOCUMENTS AND SITE.** It is the responsibility of each Bidder, before submitting a Bid, to (a) thoroughly examine the Contract Documents, (b) visit the site to become familiar with local conditions that may affect cost, progress, performance, or furnishing of the Work, (c) consider federal, state, and local laws and regulations that may affect cost, progress, performance, or furnishing of the Work, (d) study and carefully correlate Bidder's observations with the Contract Documents, and (e) notify Engineer of all conflicts, errors, or discrepancies discovered by Bidder in the Contract Documents.

4.2. Underground Facilities. Information and data reflected in the Contract Documents with respect to underground facilities at or contiguous to the site are based upon information and data furnished to Owner and

Engineer by owners of such underground facilities or others, and Owner and Engineer disclaim responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary Conditions.

4.3. Additional Information. Before submitting a Bid, each Bidder will, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests, and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface, and underground facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance, or furnishing of the Work and which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of the Contract Documents.

On request 24 hours in advance, Owner will provide each Bidder access to the site to conduct such explorations and tests as each Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the site to its former condition upon completion of such explorations. Arrangements for site visits shall be made by calling the office of the Director of Engineering for the City of Concord at 704.920.5425.

4.4. Easements. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and other lands designated for use by Contractor in performing the Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Contractor. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by Owner unless otherwise specified in the Contract Documents.

4.5. Unit Price Contracts. Bidders must satisfy themselves of the accuracy of the estimated quantities in the Bid schedule by examination of the site and a review of the drawings and the specifications, including the addenda. After Bids have been submitted, the Bidder shall not assert that there was a misunderstanding concerning the quantities of work or the nature of the work to be done.

4.6. Bidder's Representation. The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement concerning examination of the Contract Documents and the site, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

5. INTERPRETATIONS AND ADDENDA. All questions about the meaning or intent of the Quoting Documents and the Contract Documents shall be submitted to Owner in writing. Interpretations or clarifications considered necessary by Owner in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Engineer as having received the Quoting Documents. Questions received less than 10 days prior to the date for opening of Bids may not be answered. Only answers issued by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

6. **BID SECURITY.** Each Proposal must be accompanied by a deposit equal to 5% of the net price bid. This deposit may consist of cash, or a Cashier's Check issued by, or a Certified Check drawn on a Bank or Trust Company authorized to do business in North Carolina, or on a Bank insured by the Federal Deposit Insurance Corporation, or a U.S. Money Order, payable to the City of Concord or 5% Bid Bond in the form required by G.S. 143-129 as amended, issued by an Insurance Company authorized to do business in North Carolina, said deposit to be retained in the event of failure of the successful bidder to execute a formal contract within ten (10) days after award or to give satisfactory surety required.

The Bid security of the Successful Bidder (if so required) will be retained until such Bidder has executed the Agreement, furnished the required contract security (if so required), and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Agreement and furnish the required contract security within the number of days set forth in the Bid Form, Owner may annul the Notice of Award and the Bid security of that Bidder will be forfeited. The Bid security (if so required) of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of 7 days after the Effective Date of the Agreement or the day after the last day the Bid remain subject to acceptance as set forth in the Bid Form, whereupon Bid security furnished by such Bidders will be returned. Bid security accompanying Bid which are deemed by Owner to be noncompetitive will be returned within 7 days after the designated Bid opening.

7. CONTRACT TIMES. The numbers of calendar days within which, or the dates by which, the Work is to be substantially completed and completed and ready for final payment (the Contract Times) are set forth in the Bid Form.

8. LIQUIDATED DAMAGES. Provisions for liquidated damages, if any, are set forth in the Agreement.

9. SUBSTITUTES OR "OR-EQUAL ITEMS. Bidder's attention is directed to Article 6.5 of the General Conditions concerning substitutes and "or-equal" items. Where an item or material is specified by a proprietary name, it is done for the purpose of establishing a basis of quality and not for the purpose of limiting competition. The Engineer's intent is to consider alternative products which have the desired essential characteristics. The Engineer will consider any such products offered. Requests for acceptance of alternative products shall be made through Bidders quoting as prime Contractors. Acceptances for substitutions will not be granted directly to suppliers, distributors, or subcontractors. Pursuant to Section 133-3, General Statutes of North Carolina, the following procedures shall be used:

Bidders desiring to submit alternative product proposals for prior acceptance of the Engineers shall submit, in writing, such proposals from n/a, until n/a. Applications received after this time will not be reviewed. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute, including drawings, cuts, performance and test data, and other information necessary for an evaluation. A statement setting forth any changes in other materials, equipment, or other work that incorporation of the substitute would require shall be included. The Engineer shall consider and either accept or reject all alternative product proposals submitted.

If, by the close of the fifth day prior to the deadline for receiving Bid, the Engineer has accepted any alternative product proposals, the Quoting Documents shall be modified to include the alternative products. The Engineer shall publish the modification in an Addenda at least 5 days prior to the deadline for receiving Bids. The Engineer's decision of acceptance or rejection of a proposed substitute shall be final.

10. SUBCONTRACTORS, SUPPLIERS, AND OTHERS. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, and other persons and organizations (including those who are to furnish the principal items of material and equipment) to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement, the apparent Successful Bidder, and any other Bidder so requested, shall within 3 days after the opening submit to Owner the List of Subcontractors completed with all such Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work for which such identification is required. The list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, Supplier, person, or organization, if requested by Owner. If Owner or Engineer after due investigation has reasonable objection to any proposed Subcontractor, Supplier, or other person or organization, Owner may, before the Notice of Award is given, request the apparent Successful Bidder to submit an acceptable substitute without an increase in the Bid.



All Subcontractors shall be a licensed utility contractor in the State of North Carolina.

11. BID FORM. The Bid Form is bound in the Contract Documents and shall not be removed therefrom. Bid Form must be completed in ink.

Bids by corporations must be executed in the corporate name by the president or vice-president (or other corporate officer accompanied by evidence of authority to sign for the corporation). Bids by partnerships must be executed in the partnership name and signed by a partner. Bids by joint ventures shall be signed by each participant in the joint venture or by a representative of the joint venture accompanied by evidence of authority to sign for the joint venture.

The names of all persons signing shall be legibly printed below the signature. A Bid by a person who affixes to his signature the word "president", "secretary", "agent", or other designation without disclosing his principal may be held to be the Bid of the individual signing. When requested by Owner, evidence of the authority of the person signing shall be furnished.

All blanks in the Bid Form shall be filled. A Bid price shall be indicated for each unit price item listed therein, or the words "No Bid", "No Charge", "No Change", or another appropriate phrase shall be entered.

The Bid shall contain an acknowledgment of receipt of all Addenda; the numbers and dates of which shall be filled in on the Bid Form.

No alterations in Bids, or in the printed forms therefore, by erasures, interpolations, or otherwise will be acceptable unless each such alteration is signed or initialed by the Bidder; if initialed, Owner may require the Bidder to identify any alteration so initialed.

11.01. Contingency. The Contingency is to be added to the Bid price and is to be used for minor change order items. If the Contingency is to be used, a scope of work and price would be negotiated. **The Contingency is for the sole use of Owner.** A change order will be issued to delete any unauthorized portion of the Contingency.

12. SUBMISSION OF BIDS. Bids shall be submitted at the time and place indicated in the Invitation to Bid, or the modified time and place indicated by Addendum. Bids shall be enclosed in a sealed envelope or wrapping, addressed to:

The City of Concord  
Enrique Blat, PE, Deputy City Engineer  
P.O. Box 308  
635 Alfred Brown Jr Court SW  
Concord, North Carolina 28026-0308

Bids shall be marked with the name, license number, and address of the Bidder and shall be accompanied by the Bid security (if required) and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face of it.

Each Bid envelope shall be identified on the outside with the words **'BID FOR J.E. "JIM" RAMSEUR PARK – BID NUMBER 2590'**

Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

**One copy of all pages of the BID FORM must be submitted with the Bid, as well as a Bid Bond, Debarred Firms Certification Form, and MINORITY AFFIDAVIT.**

Oral, telephone, facsimile, or telegraph Bids are invalid and will not receive consideration.

No Bidder may submit more than one Bid. Multiple Bids under different names will not be accepted from one firm or association.

A conditional or qualified Bid will not be accepted.

13. MODIFICATION AND WITHDRAWAL OF BIDS. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

If, within 24 hours after Bids are opened, any Bidder files a duly signed, written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid and the Bid security (if any) will be returned. Thereafter, that Bidder will be disqualified from further quoting on the Work to be provided under the Contract Documents.

14. OPENING OF BIDS. Bids will be opened at the office and at the discretion of the Director of Engineering and read aloud.

The procedure for opening Bids will follow guidelines issued by the State Building Commission dated December 10, 1990, and endorsed by the Consulting Engineers Council of North Carolina.

15. BIDS TO REMAIN SUBJECT TO ACCEPTANCE. All Bids will remain subject to acceptance for the number of days set forth in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the security (if any) prior to that date.

16. AWARD OF CONTRACT. Owner reserves the right to reject any or all Bids, including without limitation the rights to reject any or all nonconforming, nonresponsive, unbalanced, or conditional Bids, and will award to lowest responsible Bidder taking into consideration quality, performance, and time specified in Bid Form for performance of Work. Owner also reserves the right to waive informalities.

In evaluating Bids, Owner will consider the qualifications of the Bidders, whether the Bids comply with the prescribed requirements, and such alternatives, unit prices, and other data, as may be requested in the Bid Form or prior to the Notice of Award.

Owner may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted as provided in the Supplementary Conditions. Owner also may consider the operating costs, maintenance requirements, performance data, and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.

If the Contract is to be awarded, it will be awarded to the lowest Bidder whose evaluation by Owner indicates to Owner that the award will be in the best interests of Owner. If the Contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within the number of days set forth in the Bid Form. The evaluation of Suppliers' or manufacturers' data submitted with the Bid, or submitted upon request prior to the Notice of Award, will include consideration of the following:

- Owner-required inventory of spare parts.
- Building design changes which would be required to accommodate the proposed materials and equipment.
- Installation requirements and related engineering, training, and operating costs.
- Experience and performance record of the Supplier or the manufacturer.
- Maintenance and frequency of inspections required to assure reliable performance of the equipment.
- Suppliers' or manufacturers' service facilities and availability of qualified field service personnel.
- Efficiency and related operating expense during the anticipated useful life of the equipment.

17. CONTRACT SECURITY. The General Conditions set forth Owner's requirements as to Performance and Payment Bonds (required). These Bonds shall be delivered to Owner with the executed Agreement.

18. SIGNING OF AGREEMENT. When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by two unsigned counterparts of the Agreement with all other written Contract Documents attached. Within the number of days set forth in the Bid Form, the Successful Bidder shall sign, leaving the dates blank, and deliver the required number of counterparts of the Agreement and attached documents to Owner with the required Bonds and power of attorney. Within 30 days thereafter, Owner shall execute all copies of the Agreement and other Contract Documents submitted by Contractor (Successful Bidder); shall insert the date of contract on the Agreement, Bonds, and power of attorney; and shall distribute signed copies as stipulated in the Agreement.

Should the Owner not execute the Contract within the period specified, the Successful Bidder may, by written notice, withdraw his signed Contract. Such notice or withdrawal shall be effective upon receipt of the notice by the Owner.

19. SALES AND USE TAXES. Provisions for sales and use taxes, if any, are set forth in the Supplementary Conditions.

20. RETAINAGE. Provisions concerning retainage are set forth in the Agreement.

21. LAWS AND REGULATIONS. Modifications, if any, to the General Conditions concerning Laws and Regulations are set forth in the Supplementary Conditions. Additional provisions, if any, concerning Laws and Regulations are set forth in the Agreement.

21.01. Collusive Bidding. In accordance with Section 112(c) of Title 23 USC, and G.S. 75-5(b)(7) of the State of North Carolina, the Contractor (Bidder), by submission and execution of this bid or Bid, certifies that he has not entered any agreement, participated in any collusion, or project.

DEBARRED FIRMS CERTIFICATION FORM  
**[MUST BE COMPLETED & SUBMITTED WITH BID]**

**J.E. “Jim” Ramseur Park Project No. 2022-080**

The undersigned hereby certifies that the firm of \_\_\_\_\_ has not been suspended by the State of North Carolina or any agency or department there of for conviction or indictment or any of the offenses enumerated in G.S. 133-27 nor will award subcontracts of any tier to firms that have been suspended for conviction or indictment of any of the offenses enumerated in G.S. 133-27.

\_\_\_\_\_  
Name of Firm

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

\_\_\_\_\_  
Signature of Authorized Official

\_\_\_\_\_  
Title

Sworn and subscribed before me this  
\_\_\_\_\_ day of \_\_\_\_\_, 2025.

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

BIDDERS REQUEST FOR INFORMATION FORM

Use this form to request information required for completing bid when information is not contained in the Bidding Documents. Response to request is a clarification only and does not constitute a change to the requirements of the Bidding Documents unless incorporated in a written Addendum.

Project: J.E. "Jim" Ramseur Park Project No.: 2022-080  
To: \_\_\_\_\_ Specification Section#: \_\_\_\_\_  
\_\_\_\_\_ Contractor: \_\_\_\_\_  
Attn.: \_\_\_\_\_ Requested by: \_\_\_\_\_  
Phone: \_\_\_\_\_ Phone: \_\_\_\_\_

Email: \_\_\_\_\_ Email: \_\_\_\_\_  
\_\_\_\_\_

Bidder's Inquiry:

---

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

Architect's Response: [See Addendum No: \_\_\_\_\_ ] [As follows:]

---

Signed: \_\_\_\_\_ Date: \_\_\_\_\_

## BIDDING SUBSTITUTION PROCEDURES

### 1.1 DEFINITIONS

- A. Bidding Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Bidding and Contracting Documents, submitted prior to receipt of bids.
- B. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 01 2500 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

### 1.2 QUALITY ASSURANCE

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

### 1.3 BIDDING SUBSTITUTIONS

- A. Bidding Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Bidding and Contracting Documents, including Addenda. Bidders are encouraged to request approval of qualifying substitute materials and equipment when the Specifications Sections list materials and equipment by product or manufacturer name.
- B. Bidding Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action:
  - 1. Extensive revisions to the Contract Documents are not required.
  - 2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
  - 3. The request is fully documented and properly submitted.

### 1.4 SUBMITTALS

- A. Bidding Substitution Request: Bidding Substitution Request must be made in writing Architect through Design-Builder in compliance with the following requirements:
  - 1. Requests for substitution of materials and equipment will be considered if received no later than 10 days prior to date of bid opening.
  - 2. Submittal Format: Submit single electronic copy of each written Bidding Substitution Request, using form provided by Design-Builder.
    - a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
    - b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:
      - 1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.

- 2) Copies of current, independent third-party test data of salient product or system characteristics.
  - 3) Samples where applicable or when requested by Architect.
  - 4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
  - 5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - 6) Research reports, where applicable, evidencing compliance with building code in effect for Project, from ICC-ES.
  - 7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.
- c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Bidding and Contracting Documents, and that its in-place performance will be equal to or superior to the product or equipment specified in the application indicated.
  - d. Bidder, in submitting the Bidding Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Bidding Substitution Request.

B. Architect's Action:

1. Architect may request additional information or documentation necessary for evaluation of the Bidding Substitution Request. Architect will notify all bidders of acceptance of the proposed substitute by means of an Addendum to the Bidding and Contracting Documents.

- C. Architect's approval of a substitute during bidding does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF SECTION

BIDDERS' REQUEST FOR SUBSTITUTION/PRIOR APPROVAL FORM

Use this form when use of specific manufacturers or products is required by the specifications to request consideration of an unnamed manufacturer or product. This form is not required when named products are introduced by the phrase "Available products include" Response will be in the form of a written Addendum.

Project: \_\_\_\_\_ Project No.: \_\_\_\_\_ To: \_\_\_\_\_

Specification Section #:

\_\_\_\_\_ Prime Bidder: \_\_\_\_\_ Attn.:

\_\_\_\_\_ Requested by: Phone:

\_\_\_\_\_ Phone: \_\_\_\_\_ Email:

---

Email:

Specified Product/Fabrication Method (List name/description; model #; manufacturer):

---

Required Information for Specified Product:

Attached: Point by Point Comparative Product Data

Tests Reports

Fabrication Drawings Samples (Where  
Applicable)

---

Proposed Product/Fabrication Method (List trade name/description; model no.; manufacturer) :

---

Required Information for Proposed Product:  
(Required) Tests Reports

Attached: Point by Point Comparative Product Data

Fabrication Drawings Samples (Where Applicable)

List of Related Changes/Modifications:

---

Differences between proposed substitution and specified product:

---

Proposed product/fabrication method affects other parts of the Work  No  Yes: Explain:

Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product as utilized for this project, except as noted herein.
- Qualifications of manufacturer, installer, and other specified parties meet the specified qualifications.



- Same special warranty will be furnished for proposed substitution as for specified product, if applicable.
- Same maintenance service and source for replacement parts, as applicable, is available as that specified.
- Proposed substitution does not affect dimensions and functional clearances, except as noted herein.

For the Bidder: Submitted by:

Signed: \_\_\_\_\_ Firm: \_\_\_\_\_  
\_\_\_\_\_

Telephone: \_\_\_\_\_

Email: \_\_\_\_\_

For the Manufacturer:

Submitted by:

Signed: \_\_\_\_\_ Firm: \_\_\_\_\_  
\_\_\_\_\_

Telephone: \_\_\_\_\_

\_\_\_\_\_  
Email: \_\_\_\_\_

END OF SECTION

**Exhibit A - BID FORM**

PROJECT IDENTIFICATION:

**J.E. "Jim" Ramseur Park Project No 2022-080**

THIS BID IS SUBMITTED TO:

Enrique Blat, PE, Deputy City Engineer  
City of Concord  
635 Alfred Brown Jr Court SW  
P.O. Box 308  
Concord, North Carolina 28026-0308

1. The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter an agreement with Owner in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents within the specified time and for the amount indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

2. Bidder accepts all the terms and conditions of the Invitation to Bid and the Instructions to Bid, including without limitation those dealing with the disposition of the Bid security (if security is required by the City Manager). This Bid will remain subject to acceptance for 60 days after the day designated for reception of Bids. Bidder will sign and submit the Agreement with the Bonds and other documents required by the Quoting Documents within 10 days after the date of Owner's Notice of Award.

3. In submitting this Bid, Bidder represents that:

a. Bidder has examined copies of all the Quoting Documents and of the following Addenda (receipt of all which is hereby acknowledged):

No. \_\_\_\_\_ Dated \_\_\_\_\_

No. \_\_\_\_\_ Dated \_\_\_\_\_

No. \_\_\_\_\_ Dated \_\_\_\_\_

No. \_\_\_\_\_ Dated \_\_\_\_\_

No. \_\_\_\_\_ Dated \_\_\_\_\_

b. Bidder has visited the site and become familiar with and satisfied itself as to the general, local, and site conditions that may affect cost, progress, performance, and furnishing of the Work.

c. Bidder is familiar with and has satisfied itself as to all Federal, State, and Local Laws and Regulations that may affect cost, progress, performance, and furnishing of Work.

d. Bidder has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except underground facilities) which have provided by the owner and under the conditions normally used and identified in the Supplementary Conditions and Special Conditions as provided in Paragraph 4.2.1 of the General Conditions. Bidder accepts the determination set forth in the Supplementary Conditions and Special Conditions of the extent of the "technical data" contained in such reports and drawings upon which Bidder is entitled to rely as provided in Paragraph 4.2 of the General Conditions. Bidder acknowledges that such reports and drawings are not Contract

Documents and may not be complete for Bidder's purposes. Bidder acknowledges that Owner and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Quoting Documents with respect to underground facilities at or contiguous to the site. Bidder has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance, or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder and safety precautions and programs incident thereto. Bidder does not consider that any additional examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the time, price, and other terms and conditions of the Contract Documents.

- e. Bidder is aware of the general nature of Work to be performed by Owner and others at the site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.
- f. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.
- g. Bidder has given Engineer written and verbal notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Bidder, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.
- h. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid Bidder has not solicited or induced any person, firm, or corporation to refrain from quoting; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

4. The terms used in this BID, which are defined in the General Conditions, have the meanings assigned to them in the General Conditions.

**DATE:** \_\_\_\_\_

**NAME OF BIDDER:** \_\_\_\_\_

**BUSINESS ADDRESS:** \_\_\_\_\_

\_\_\_\_\_

**PHONE:** \_\_\_\_\_

**FAX:** \_\_\_\_\_

**EMAIL:** \_\_\_\_\_

**NC CONTRACTOR NO.:** \_\_\_\_\_

In compliance with the Instructions to Bidders, the undersigned, having carefully examined the Bidding Documents, Scope of Work, Special Provisions, Drawings and Specifications, all subsequent Addenda as prepared by the Owner, visited the site and being familiar with all conditions and requirements of the work, hereby agrees to furnish all labor, materials, equipment and services, etc., to complete the work required in accordance with the Contract Documents for the consideration of the following amount/amounts.

**LUMP SUM BASE BID** (Fill in amount in words and figures, words to govern in case of conflict) includes amount shown hereinafter in Performance and Payment Bonds:

The undersigned Bidder, having carefully investigated the existing conditions at the project site, and having thoroughly familiarized himself with the Contract Documents as prepared by **Woolpert, North Carolina, PLLC** hereby proposes to provide all necessary labor, equipment, materials, services and etc. to complete the construction of Lump Sum Item "Part A." Part A serves to include all aspects of the project not listed in Part B and C of the Bid Form. Please note, if there is not a unit cost line item specifically associated with any element of this project, it will be covered by Part A. Again, Part A will cover all aspects of the project not specifically addressed by unit costs in Part B and C. Including but not limited to:

- **J.E. "Jim" Ramseur Park**
- **Comprehensive Demolition**
- **Comprehensive Landscaping**
- **Site Electrical with Provisions for Sports Lighting\***
- **Water Odyssey & Aquaworx Splash Pad or Approved Equivalent Design\***
- **Gametime Playgrounds or Approved Equivalent Design\***
- **Installation of Owner Provided Site Amenities**
- **Splashpad Pavilion Structure**
- **Pickleball and Basketball Restroom Buildings**
- **New Maintenance Building**
- **All Site Shelter Pavilions**
- **Shade Structures and Gates**
- **Site Handrails and Fencing**
- **Site Erosion Control**
- **Dog Parks**
- **Traffic Control**
- **Court Border Curb and Playground Curb**
- **Cast in Place Retaining Walls**

\*See Project Special Conditions for more information

All in accordance with the aforementioned Contract Documents for the lump sum price of:

**Part A** Total Lump Sum Items Cost

\$ \_\_\_\_\_

**Part B** – Site Work

J.E. Jim Ramseur Park, Project # 2022-080						
Part B – Site Work						
Item No.	NCDOT Section	Description	QTY.	Unit	Unit Price (\$)	Total Cost (\$)
1	800	Mobilization	1	LS		
2	SP	Comprehensive Grading	1	LS		
3	801	Construction Surveying, incl. final as-builts of underground detention and site utilities	1	LS		
4	1607	Gravel Construction Entrance	3	EA		
Erosion Control						
5	1605	Temporary Silt Fence	4500	LF		
6	866	Temporary Construction Chain Link Perimeter Fencing w/ Gates	3000	LF		
7	SP, C800	Silt Fence Outlet/Stone Opening	20	EA		
8	SP, C800	Reinforced Silt Fence	3500	LF		
9	SP, C800	Tree Protection Fencing	8500	LF		
10	C800	Concrete Washouts	3	EA		
11	SP, C800	Temporary Diversion Berm/Swale	4000	LF		
12	1633, C801	Rock Check Dam or Straw Wattle	250	EA		
13	1660	Seeding and Mulching	25.0	AC		
14	C800	Storm Drain Inlet Protection	75	EA		
15	C312, C801	Temp. Sediment Basin: Incl. Rip Rap Aprons, Skimmer, Skimmer Discharge Pipe, Baffles, Anti-Seep Collar, and all other necessary items	3	EA		
16	C834-837	Permanent Underground Detention System, East, incl. all necessary materials and installation	1	LS		
17	C834-837	Permanent Underground Detention System, West, incl. all necessary materials and installation	1	LS		

18	SP	Tufftrack Grass Pavers or equiv.	400	SY		
19	SP, C814	Baselok Geocell System or equiv.	1500	SY		
Asphalt and Concrete Paving						
20	520	NCDOT Aggregate Base Course (ABC)	7500	TN		
21	270	Type 4 Geotextile for Soil Stabilization	9000	SY		
22	SP, S-102-BW	Greenway Bridges, 14' Clear Width, incl. timber tie abutments and foundations	2	EA		
23	SP, S-102-BW	Greenway Bridges, 10' Clear Width, incl. timber tie abutments and foundations	2	EA		
24	SP, S-101-BW	Greenway Boardwalk, 10' Clear Width, incl. foundations	350	LF		
25	SP, S-101-BW	Greenway Boardwalk, 6' Additional Width, incl. foundations	43	LF		
26	SP, C813	Concrete Wheelstops	11	EA		
27	1087, C812	Painted Crosswalks Thermoplastic 90 mils	22	EA		
28	846	1'-6" Curb and Gutter Incl. Sloped Ends and Tapers	7000	LF		
29	SP, 610	Pickleball/Basketball Court Asphalt	450	TN		
30	SP, C817	Basketball/Pickleball Court Acrylics and Striping	2600	SY		
31	610	Asphalt Surface Course, Type S9.5C	3200	TN		
32	848, 1000	4" Concrete Sidewalk, incl. HC Ramps, Bench Pads, Waste Station Pads, Bicycle Racks, 3600 PSI	7500	SY		
33	1000, 710	8" Concrete 4000 PSI, Dumpster Pad	100	SY		
34	848	Detectable Warning Plates	700	SF		
35	1087, 1205	Parking Lot Striping, Thermoplastic Pavement Markings, 4", 90 mils	6500	LF		
36	1087, 1205	Handicap Parking Symbol, Thermoplastic 90 mils	11	EA		
37	1087, 1205	Stop Bars, Thermoplastic Pavement Markings, 24", 120 mils	70	LF		
38	C812	Accessible Parking/Handicap Signage	11	EA		
Site Amenities						
39	B101-B502	MSE Retaining Wall, incl. footing, stone, drains, and all other necessary items	3850	SF		
40	SP, B-201	Geogrid for Retaining Wall, Gridlock 370 or Equiv.	2200	SY		
41	A-101-PS	Park Entrance Monument with Signage	1	LS		
42	C814	Collapsible Steel Bollard Install, Owner Provided Bollard	10	EA		

43	C814	Permanent Steel Bollard, Contractor Provided Bollard	10	EA		
44	C816	Concrete Stairs Type A	30	SF		
45	C816	Concrete Stairs Type B	275	SF		
46	C816	Concrete Stairs Type C	325	SF		
47	C816	Concrete Stairs Type D	300	SF		
Water and Sewer						
48	WSACC, C400-C431	Water and Sewer Site Utilities, incl. all costs to install all utilities as shown in Project Drawings	1	LS		
Storm Drain						
49	310	12" RCP Storm Pipe (Class IV)	250	LF		
50	310	15" RCP Storm Pipe (Class IV)	1600	LF		
51	310	18" RCP Storm Pipe (Class IV)	1900	LF		
52	310	24" RCP Storm Pipe (Class IV)	150	LF		
53	310	30" RCP Storm Pipe (Class IV)	35	LF		
54	310	36" RCP Storm Pipe (Class IV)	52	LF		
55	310	36" O-Ring RCP Storm Pipe (Class IV)	200	LF		
56	310	42" RCP Storm Pipe (Class IV)	44	LF		
57	310	15" HDPE Storm Drain	75	LF		
58	310	18" HDPE Storm Drain	150	LF		
59	310	36" HDPE Storm Drain	26	LF		
60	310	42" HDPE Storm Drain	35	LF		
61	C321	15" RCP Headwall	2	EA		
62	C321	18" RCP Headwall	1	EA		
63	C321	36" Pipe Headwall (HW A1 and HW B1)	2	EA		
64	840	15" Nyoplast Drainage Structure	2	EA		
65	840	18" Nyoplast Drainage Structure	8	EA		
66	840	30" Nyoplast Drainage Structure	4	EA		
67	840	Catch Basin w/ Frame and Grate	34	EA		
68	840	Curb Inlet w/ Frame, Grate, and Hood	18	EA		
69	840	Shallow Catch Basin w/ Frame and Grate	5	EA		
70	840	Shallow Curb Inlet w/ Frame, Grate, and Hood	1	EA		
71	840	48" Dia. Stormwater Manhole w/ Ring and Cover	3	EA		

72	840	48" Dia. Shallow Stormwater Manhole w/ Ring and Cover	1	EA		
73	840	60" Dia. Stormwater Manhole w/ Ring and Cover	2	EA		
<b>Part B Total Cost: \$</b>						

**Part C – Cox Mill Roadway Improvements, Line Items to Only be used for Work described in Vol. 3 of the Plans**

<b>J.E. Jim Ramseur Park, Project # 2022-080</b>						
<b>Part C – Cox Mill Roadway Improvements</b>						
Item No.	NCDOT Section	Description	QTY.	Unit	Unit Price (\$)	Total Cost (\$)
1	310	15" RC Pipe Culv. Class IV	50	LF		
2	520	NCDOT Aggregate Base Course	25	TN		
3	607	Milling Asphalt Pavement, 1.5" Depth	700	SY		
4	607	Incidental Milling	100	SY		
5	610	Asphalt Conc Base Course, Type B25.0C	200	TN		
6	610	Asphalt Conc Intermediate Course, Type I19.0C	200	TN		
7	610	Asphalt Conc Surface Course, Type S9.5C	200	TN		
8	846	2'-6" Concrete Curb and Gutter	200	LF		
9	848	4" Concrete Sidewalk incl. Curb Ramps	50	SY		
10	SP	Detectable Warning Plates	24	SF		
11	852	5" Monolithic Concrete Islands (Surface Mounted)	20	SY		
12	876	Geotextile for Drainage	125	SY		
13	1205	Thermoplastic Pavement Marking Lines (4", 90 MILS)	1400	LF		
14	1205	Thermoplastic Pavement Marking Lines (8", 90 MILS)	155	LF		
15	1205	Thermoplastic Pavement Marking Lines (24", 120 MILS)	16	LF		
16	1205	Thermoplastic Pavement Marking Symbol (90 MILS)	3	EA		
17	901	Contractor Furnished, Type E Sign	9.25	SF		
18	903	Supports, 3-LB Steel U-Channel	45	LF		
19	904	Sign Erection, Type E Sign	2	EA		



20	904	Sign Erection, Relocate Type E (Ground Mounted)	1	EA		
21	1605	Temporary Silt Fence	300	LF		
22	1622	Temporary Slope Drains	200	LF		
23	SP	Safety Fence	75	LF		
24	1642	Coir Fiber Wattle	200	LF		
25	1660	Seeding & Mulching	3.0	AC		
26	SP	Concrete Washout Structure	1	EA		
<b>Part C Total Cost: \$</b>						

Estimated Base Cost (Part A + Part B + Part C): \$	
5% Contingency: \$	
Total Estimated Cost: \$	

The undersigned further agrees that this proposal shall be valid for a period of ninety days from the date of receipt of the bids and that if this proposal is accepted by The City of Concord within this period, the Bidder will execute the contract form.

The undersigned further agrees to begin the work promptly upon receipt of Notice to Proceed and to pursue the work with an adequate, competent, commercial work force to complete the work within **730** calendar days from the Notice to Proceed. By submitting this bid, the Contractor agrees that the calendar days for construction stated above will be adequate for 100% completion of the project, and that he can deliver a Certificate of Occupancy within that period. Liquidated Damages of **\$ 1000** per calendar day are hereby agreed upon as assessment from the Contractor for failure to complete the work within the time stated herein. In addition to Liquidated Damages, the Owner may also exercise their right to recover all other losses.

Accompanying this proposal is a bid security (5% of Contract Sum) in the form of: \_\_\_\_\_ as required by North Carolina General Statute.

**TIME OF COMPLETION**

The undersigned further agrees to begin work within ten (10) days after a "Notice to Proceed" with an adequate work force, carry the work forward as rapidly as possible and complete the work within **730** calendar days.

SIGNATURE OF BIDDER: \_\_\_\_\_

Contractor's License Number \_\_\_\_\_

License Expiration Date \_\_\_\_\_

If an Individual

By \_\_\_\_\_  
(signature of individual)

doing business as \_\_\_\_\_

Business address \_\_\_\_\_

Phone No. \_\_\_\_\_

Date \_\_\_\_\_, 20\_\_\_\_

ATTEST \_\_\_\_\_ TITLE

If a Partnership

By \_\_\_\_\_  
(firm name)

\_\_\_\_\_  
(signature of general partner)

Business address \_\_\_\_\_

Phone No. \_\_\_\_\_

Date \_\_\_\_\_, 20\_\_\_\_

ATTEST \_\_\_\_\_ TITLE \_\_\_\_\_

If a Corporation

By \_\_\_\_\_  
(corporation name)

By \_\_\_\_\_  
(signature of authorized person) (title) \_\_\_\_\_

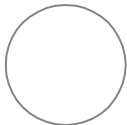
Business address \_\_\_\_\_

Phone No. \_\_\_\_\_

Date \_\_\_\_\_, 20\_\_\_\_

ATTEST \_\_\_\_\_ TITLE \_\_\_\_\_

(Seal)



**If a Joint Venture (Other party must sign below.)**

By (name) \_\_\_\_\_

Contractor's License Number \_\_\_\_\_

License Expiration Date \_\_\_\_\_

**If an Individual**

By \_\_\_\_\_  
(signature of individual)

doing business as \_\_\_\_\_

Business address \_\_\_\_\_

Phone No. \_\_\_\_\_

Date \_\_\_\_\_, 20\_\_\_\_

ATTEST \_\_\_\_\_ TITLE

If a Partnership

By \_\_\_\_\_  
(firm name)

\_\_\_\_\_  
(signature of general partner)

Business address \_\_\_\_\_

Phone No. \_\_\_\_\_

Date \_\_\_\_\_, 20 \_\_\_\_\_

ATTEST \_\_\_\_\_ TITLE \_\_\_\_\_

If a Corporation

By \_\_\_\_\_  
(corporation name)

By \_\_\_\_\_  
(signature of authorized person)(title) \_\_\_\_\_

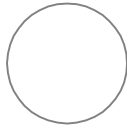
Business address \_\_\_\_\_

Phone No. \_\_\_\_\_

Date \_\_\_\_\_, 20 \_\_\_\_\_

ATTEST \_\_\_\_\_ TITLE \_\_\_\_\_

(Seal)



**STANDARD FORM OF  
PERFORMANCE BOND**

Date of Execution of this Bond \_\_\_\_\_

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

Name and Address  
of Surety \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Name and Address of  
Contracting Body \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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

Contract That certain contract by and between the Principal and the  
Contracting Body above named dated \_\_\_\_\_  
for \_\_\_\_\_  
\_\_\_\_\_

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

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal entered a certain contract with the Contracting Body, identified as shown above and hereto attached;

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

**PERFORMANCE BOND: (Continued)**

THIS PERFORMANCE BOND is made and given pursuant to the requirements and provisions of Section 129 of Chapter 143 of the General Statutes of North Carolina and pursuant to Article 3 of Chapter 44-A of the General Statutes of North Carolina, and each and every provision set forth and contained in Section 129 of Chapter 143 and in Article 3 of Chapter 44-A of the General Statutes of North Carolina is incorporated herein, made a part hereof, and deemed to be conclusively written into this Bond.

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

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

Principal (Name of individual and trade name, partnership, corporation, or joint venture)

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

Printed Name \_\_\_\_\_

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

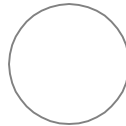
Printed Name \_\_\_\_\_

TITLE \_\_\_\_\_  
(Owner, Partner, Office held in corporation, joint venture)

ATTEST: (Corporation)

**(Corporate Seal of Principal)**

BY \_\_\_\_\_



Printed Name \_\_\_\_\_

TITLE \_\_\_\_\_  
(Corporation Secretary or Assistant Secretary Only)

\_\_\_\_\_  
Surety (Name of Surety Company)

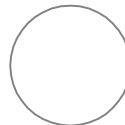
WITNESS:

BY \_\_\_\_\_

Printed Name \_\_\_\_\_

TITLE Attorney in Fact

**(Corporate Seal of Surety)**



COUNTERSIGNED:

\_\_\_\_\_  
(Address of Attorney in Fact)

\_\_\_\_\_  
N.C. Licensed Resident Agent

## PROJECT SPECIAL CONDITIONS

1. The Contractor will provide all materials unless otherwise noted.
  - The Sports Lighting on this project is contracted separately through the City of Concord Parks and Recreation Department. It is the site Contractor's responsibility to install all panels and wiring to panels as shown on the Electrical Drawings. It is also the Contractor's responsibility to install the conduit, hand pull boxes, and stubs to each sports lighting pole and lighting control box. The Contractor will not be responsible for wiring from the lighting control boxes to the poles. It is the Contractor's responsibility to communicate with the Owner's sports lighting subcontractor to ensure the sequencing of the lighting installation fits within the rest of the project.
2. Please email Noah Shaver, EI [shavertn@concordnc.gov](mailto:shavertn@concordnc.gov) to arrange a site visit.
3. The Contractor is responsible for transferring financial responsibility of the NCDEQ Erosion Control permit prior to starting construction. The Contractor must also submit the eNOI to NCDEQ and pay all fees prior to construction.
4. Contractor will be responsible for all permits and associated fees. This includes all water and sewer fees. The contractor shall also be responsible for the offsite disposal of all removed materials (asphalt, concrete, unsuitable materials, etc.)
5. Install only high efficiency toilets (1.28 gallons per flush) and water efficient urinals as required for all new City-owned facilities and retro-fits, where practicable.
6. Bidders must document and provide three (3) references of businesses/organizations for which the Bidder/General Contractor have successfully completed similar park/greenway/site development projects of similar scope and budget within the last eight (8) years. Prefer a minimum of one (1) reference from a municipality, county government or public agency.
7. The subcontractor that installs the Splashpad equipment must be a Water Odyssey Certified Installer with a minimum of 3 installations of similar size and scope.
8. An NC Professional Engineer sealed structural evaluation for the Underground Detention chambers shall be submitted as part of the material submittal prior to installation.
  - It is the responsibility of the contractor to schedule a preconstruction meeting onsite with the Manufacturer's representative prior to installation of underground detention chambers
  - Underground Detention chambers to be installed in accordance with the "Stormtech MC-3500/MC-4500 Construction Guide"
9. The installer of the Pickleball and Basketball Court acrylic coatings must have built and completed five (5) projects of similar complexity and scope (asphalt, court surfacing equipment installation etc.) in each of the last five (5) consecutive years. It is also highly recommended that the contractor be a member of the ASBA (Former: US Tennis Court & Track Builders Assoc.) to add to their qualifications.
  - Pickleball and Basketball Court surfaces must conform to the guidelines of the ASBA for planarity



- All surface coating products shall be supplied by a single manufacturer
- The installer shall be an authorized applicator of the specified system

10. Basis of Design for the Splashpad is Water Odyssey & Aquaworx as shown in the Project Drawings.

- The “Basis of Design” manufacturer “Water Odyssey& Aquaworx” has been used to create engineered and stamped drawings in the bid documents. These documents to be used for and submitted by the Owner for health department approval. If Basis of Design is used, then no contractor splash pad delegated design or health department approval is required by the contractor.
- If the “Basis of Design” manufacturer “Water Odyssey & Aquaworx” is not carried in the contractor’s bid, then the contractor must submit prior to bid, a design submittal indicating the design is an equal for aesthetics and technical requirements. If approved as equal then the contractor by delegated design will be responsible for all costs and coordination to provide engineered and stamped drawings by an engineer licensed in the State of North Carolina, and all cost and labor necessary to obtain approval by the health department.

11. Basis of Design for the Playground is GameTime as shown in the Project Drawings.

- The “Basis of Design” manufacturer “GameTime” has been used to create an integrated design responsive to other park elements as indicated in the documents.
- If the “Basis of Design” manufacturer “GameTime” is not carried in the contractor’s bid, then the contractor must submit prior to the bid a design submittal indicating the design is an equal for aesthetics and technical requirements. If approved as equal, then the contractor by delegated design will be responsible for all costs and coordination to playground design and provide engineering drawings if required by the local authority having jurisdiction.

12. As noted in Part B of the Bid Form it will be the responsibility of the contractor to provide as-built surveys of site water and sewer utilities, including the pump station, and as-built surveys of the installed underground detention system. These final surveys must be sealed by a North Carolina licensed Professional Land Surveyor.

13. All work shall meet the following standards:

- NC State Building Code – 2018**
- NC Administrative Code and Policies – 2018**
- NC Mechanical Code – 2018**
- NC Plumbing Code – 2018**
- NEC – National Electrical Code**
- NC Electrical Code – 2018**
- NC Energy Conversation Code – 2018**
- NC Fuel Gas Code – 2018**
- AA – Aluminum Association**
- AAMA – American Architectural Manufacturers Association**
- ACI – American Concrete Institute**
- AF&PA – American Forest & Paper Association**
- AISC – American Institute of Steel Construction**
- AISI – American Iron and Steel Institute**
- AITC – American Institute of Timber Construction**
- ANSI – American National Standards Institute**
- APA – Engineered Wood Association**

**ASCE/SEI – American Society of Civil Engineers Structural Engineering Institute**  
**ASME – American Society of Mechanical Engineers**  
**ASTM – ASTM International**  
**AWCI – Association of the Wall and Ceiling Industry**  
**AWPA – American Wood Protection Association**  
**AWS – American Welding Society**  
**BHMA – Builders Hardware Manufacturer’s Association**  
**CPA – Composite Panel Association**  
**CPSC – Consumer Product Safety Commission**  
**CSA – Canadian Standards Associations**  
**CSSB – Cedar Shake and Shingle Bureau**  
**DASMA – Door and Access Systems Manufactures Association International**  
**DOC – US Dept. of Commerce – National Institute of Standards and Technology**  
**DOJ – US Department of Justice**  
**DOL – US Department of Labor**  
**GA – Gypsum Association**  
**HPVA – Hardwood Plywood Veneer Association**  
**ICC – International Code Council**  
**NAAMM – National Association of Architectural Metal Manufacturers**  
**NCMA – National Concrete Masonry Association**  
**NFPA – National Fire Protection Association**  
**PCI – Precast Pre-Stressed Concrete Institute**  
**PTI – Post-Tensioning Institute**  
**RMI – Rack Manufacturers Institute**  
**SDI – Steel Deck Institute**  
**SJI – Steel Joist Institute**  
**SPRI – Single-Ply Roofing Institute**  
**TIA – Telecommunications Industry Association**  
**TMS – The Masonry Society**  
**TPI – Truss Plate Institute**  
**UL – Underwriters Laboratories, Inc.**  
**WDMA – Window and Door Manufacturers Association**  
**WRI – Wire Reinforcement Institute**  
END OF SECTION

## **PROJECT SCOPE**

The Project consists of the demolition of existing site structures and construction of the new J.E. “Jim” Ramseur Park, including, but not limited to, sitework, Cox Mill roadway improvements, park amenities, greenway, shelters, pickleball restroom building, splashpad pavilion/restroom building, basketball restroom building, and a maintenance building. The project includes sitework and vertical construction on the neighboring school property through agreement with the City.

END OF SECTION

# **MINORITY INFORMATION AND AFFIDAVITS**

1. All bidders for City of Concord Projects shall attempt to recruit and select Minority Businesses to participate in its Projects. Required affidavits shall be attached to all bids. See attached guidelines:

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

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

### **SECTION A: INTENT**

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

### **SECTION B: DEFINITIONS**

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

5. Owner - The State of North Carolina, through the Agency/Institution named in the contract.
6. Designer – Any person, firm, partnership, or corporation, which has contracted with the State of North Carolina to perform architectural or engineering, work.
7. Bidder - Any person, firm, partnership, corporation, association, or joint venture seeking to be awarded a public contract or subcontract.
8. Contract - A mutually binding legal relationship or any modification thereof obligating the seller to furnish equipment, materials or services, including construction, and obligating the buyer to pay for them.
9. Contractor - Any person, firm, partnership, corporation, association, or joint venture which has contracted with the State of North Carolina to perform construction work or repair.
10. Subcontractor - A firm under contract with the prime contractor or construction manager at risk for supplying materials or labor and materials and/or installation. The subcontractor may or may not provide materials in his subcontract.

### **SECTION C: RESPONSIBILITIES**

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

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

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

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

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

2. State Construction Office

The State Construction Office will be responsible for the following:

- a. Furnish to the HUB Office a minimum of twenty-one days prior to the bid opening the following:
  - (1) Project description and location;
  - (2) Locations where bidding documents may be reviewed;

- (3) Name of a representative of the owner who can be contacted during the advertising period to advise who the prospective bidders are;
  - (4) Date, time and location of the bid opening.
  - (5) Date, time and location of prebid conference, if scheduled.
- b. Attending scheduled prebid conference, if necessary, to clarify requirements of the general statutes regarding minority-business participation, including the bidders' responsibilities.
  - c. Reviewing the apparent low bidders' statutory compliance with the requirements listed in the proposal, that must be complied with, if the bid is to be considered as responsive, prior to award of contracts. The State reserves the right to reject any or all bids and to waive informalities.
  - d. Reviewing of minority business requirements at Preconstruction conference.
  - e. Monitoring of contractors' compliance with minority business requirements in the contract documents during construction.
  - f. Provide statistical data and required reports to the HUB Office.
  - g. Resolve any protest and disputes arising after implementation of the plan, in conjunction with the HUB Office.

### 3. Owner

Before awarding a contract, owner shall do the following:

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

### 4. Designer

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

- a. Attend the scheduled prebid conference to explain minority business requirements to the prospective bidders.
- b. Assist the owner to identify and notify prospective minority business prime and subcontractors of potential contracting opportunities.
- c. Maintain documentation of any contacts, correspondence, or conversation with minority business firms made in an attempt to meet the goals.
- d. Review jointly with the owner, all requirements of G.S. 143-128.2(c) and G.S.143-128.2(f)– (i.e. bidders’ proposals for identification of the minority businesses that will be utilized with corresponding total dollar value of the bid and affidavit listing Good Faith Efforts, or affidavit of self-performance of work, if the contractor will perform work under contract by its own workforce) - prior to recommendation of award.
- e. During construction phase of the project, review “MBE Documentation for Contract Payment” – (Appendix E) for compliance with minority business utilization commitments. Submit Appendix E form with monthly pay applications to the owner and forward copies to the State Construction Office.
- f. Make documentation showing evidence of implementation of Designer’s responsibilities available for review by State Construction Office and HUB Office, upon request.

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

Under the single-prime bidding, the separate-prime bidding, construction manager at risk and alternative contracting methods, contractor(s) will:

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

If there are more than three (3) minority businesses in the general locality of the project who offer similar contracting or subcontracting services in the specific trade, the contractor(s) shall notify three (3), but may contact more, if the contractor(s) so desires.

- d. During the bidding process, comply with the contractor(s) requirements listed in the proposal for minority participation.
- e. Identify on the bid, the minority businesses that will be utilized on the project with corresponding total dollar value of the bid and affidavit listing good faith efforts as required by G.S. 143-128.2(c) and G.S. 143-128.2(f).
- f. Make documentation showing evidence of implementation of PM, CM-at-Risk and First-Tier Subcontractor responsibilities available for review by State Construction Office and HUB Office, upon request.
- g. Upon being named the apparent low bidder, the Bidder shall provide one of the following: (1) an affidavit (Affidavit C) that includes a description of the portion of work to be executed by minority businesses, expressed as a percentage of the total contract price, which is equal to or more than the applicable goal; (2) if the percentage is not equal to the applicable goal, then documentation of all good faith efforts taken to meet the goal. Failure to comply with these requirements is grounds for rejection of the bid and award to the next lowest responsible and responsive bidder.
- h. The contractor(s) shall identify the name(s) of minority business subcontractor(s) and corresponding dollar amount of work on the schedule of values. The schedule of values shall be

provided as required in Article 31 of the General Conditions of the Contract to facilitate payments to the subcontractors.

- i. The contractor(s) shall submit with each monthly pay request(s) and final payment(s), “MBE Documentation for Contract Payment” – (Appendix E), for designer’s review.
- j. During the construction of a project, at any time, if it becomes necessary to replace a minority business subcontractor, immediately advise the owner, State Construction Office, and the Director of the HUB Office in writing, of the circumstances involved. The prime contractor shall make a good faith effort to replace a minority business subcontractor with another minority business subcontractor. If during the construction of a project additional subcontracting opportunities become available, make a good faith effort to solicit subbids from minority businesses.
- k. It is the intent of these requirements apply to all contractors performing as prime contractor and first tier subcontractor under construction manager at risk on state projects.

6. Minority Business Responsibilities

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

**SECTION 4: DISPUTE PROCEDURES**

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

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

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

## MINORITY BUSINESS CONTRACT PROVISIONS (CONSTRUCTION)

### APPLICATION:

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

### MINORITY BUSINESS SUBCONTRACT GOALS:

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

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

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

**OR**

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

**OR**

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

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



## **MINIMUM COMPLIANCE REQUIREMENTS:**

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

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

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

**MBE DOCUMENTATION FOR CONTRACT PAYMENTS**

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

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

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

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

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

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

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

Date: \_\_\_\_\_ Approved/Certified By: \_\_\_\_\_  
Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

**SUBMIT WITH EACH PAY REQUEST & FINAL PAYMENT**

(Revised on 3/14/2003)



**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)

- D 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.
- D 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.
- D 3 – (15 pts)** Broken down or combined elements of work into economically feasible units to facilitate minority participation.
- D 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.
- D 5 – (10 pts)** Attended prebid meetings scheduled by the public owner.
- D 6 – (20 pts)** Provided assistance in getting required bonding or insurance or provided alternatives to bonding or insurance for subcontractors.
- D 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.
- D 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.
- D 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.
- D 10 - (20 pts)** Provided quick pay agreements and policies to enable minority contractors and suppliers to meet cash-flow demands.

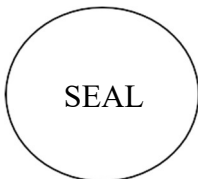
The undersigned, if apparent low bidder, will enter into a formal agreement with the firms listed in the Identification of Minority Business Participation schedule conditional upon scope of contract to be executed with the Owner. Substitution of contractors must be in accordance with GS143-128.2(d) Failure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

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 2025

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

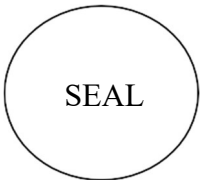
The Bidder agrees to provide any additional information or documentation requested by the owner in support of the above statement.

The 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 North Carolina, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 2025

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

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

## State of North Carolina - AFFIDAVIT C - Portion of the Work to be Performed by Minority Firms

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 minority businesses as defined in GS143-128.2(g) is equal to or greater than 10% of the bidder's 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	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)

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: \_\_\_\_\_

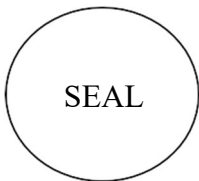
Title: \_\_\_\_\_

State of North Carolina, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 2025

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

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



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

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

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

Name of Bidder

I do certify the attached documentation as true and accurate representation of my good faith efforts.

(Attach additional sheets if required)

Name and Phone Number	Minority Category	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)

Documentation of the Bidder's good faith efforts to meet the goals set forth in these provisions. Examples of documentation include, but are not limited to, the following evidence:

- 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.

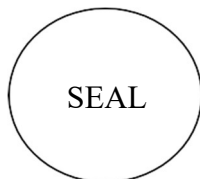
Date: \_\_\_\_\_ Name of Authorized Officer: \_\_\_\_\_

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

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

State of North Carolina, County of \_\_\_\_\_

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_ 2025



**NOTICE OF AWARD**

TO:

FROM: City of Concord City Council (OWNER)  
P.O. Box 308  
35 Cabarrus Ave. W  
Concord, North Carolina 28026-0308

PROJECT: **J.E. Jim Ramseur Park**  
**Project No. 2022-080**

You are hereby notified that the bid submitted by you for the above-named project in response to the City of Concord’s Invitation to Bid, dated **February 6, 2025** in the amount of

\_\_\_\_\_ and \_\_\_\_\_/100 DOLLARS

(\$\_\_\_\_\_) has been accepted.

You are hereby required to execute the formal AGREEMENT with the City of Concord City Council and to furnish any and all Contractor’s Bond(s), Certificate of Insurance and Power of Attorney(s) along with other documents pertaining to the work as designated by the City of Concord.

If you fail to execute said AGREEMENT and to furnish this and any other required documents pertaining to the work within ten (10) days from the date of delivery of this NOTICE OF AWARD, said Owner will be entitled to consider all your rights arising out of the Owner’s acceptance of your bid as abandoned and to award the work covered by your proposal to another, or to re-bid the work or otherwise dispose thereof as the Owner may see fit.

**Dated this the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_**

City of Concord, North Carolina

CONTRACTOR

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

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

Title: City Manager

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

*ACCEPTANCE OF NOTICE OF AWARD*

Receipt of the above NOTICE OF AWARD is hereby acknowledged this the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.



**NOTICE TO PROCEED**

TO:

FROM: City of Concord City Council (OWNER)  
P.O. Box 308  
35 Cabarrus Ave. W  
Concord, North Carolina 28026-0308

PROJECT: **J.E. Jim Ramseur Park**  
**Project No. 2022-080**

Contract Amount: \_\_\_\_\_ and \_\_\_\_/100 DOLLARS  
(\$ \_\_\_\_\_).

You are hereby notified to commence work on or before the \_\_\_\_\_ day of \_\_\_\_, 20\_\_, pending acceptance of your Certificate of Insurance and any other required documents, and are to fully complete the work by the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

Your project final completion date is therefore the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_, and as set forth in the above named project's schedule unless an extension is granted by the City of Concord Director of Engineering in writing.

City of Concord, North Carolina

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

Title: City Manager

Dated this the \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

## STANDARD FORM CONSTRUCTION CONTRACT

This contract (together with all exhibits and valid amendments, the "Agreement" or the "Contract") is made and entered into as of the \_\_\_ day of \_\_\_\_\_, 20\_\_\_, by the City of CONCORD ("City") and \_\_\_\_\_ ("Contractor"), ( ) a corporation, ( ) a professional corporation, ( ) a professional association, ( ) a limited partnership, ( ) a sole proprietorship, or ( ) a general partnership; organized and existing under the laws of the State of \_\_\_\_\_.

### **Sec. 1. Background and Purpose.**

The Project consists of the demolition of existing site structures and construction of the new J.E. "Jim" Ramseur Park, including, but not limited to, sitework, Cox Mill roadway improvements, park amenities, greenway, shelters, pickleball restroom building, splashpad pavilion/restroom building, basketball restroom building, and a maintenance building. The project includes sitework and vertical construction on the neighboring school property through agreement with the City.

**Sec. 2. Services and Scope to be Performed.** The Contractor shall provide the services at the charges set forth either in this paragraph or in Exhibit "A". Additional exhibits may be used to further define this Agreement when the Contractor and City so agree. Any additional exhibits shall be designated as exhibits to the Agreement with capitalized, sequential letters of the alphabet, shall be attached hereto and incorporated herein by reference as if the same were fully recited, and shall become terms of this Agreement upon execution by both parties.

In this Contract, "services" means the services that the Contractor is required to perform pursuant to this Contract and all of the Contractor's duties to the City that arise out of this Contract. Any amendments, corrections, or change orders by either party must be made in writing signed in the same manner as the original. (This form may be used for amendments and change orders.) The City reserves the right to refuse payment for any work outside that authorized herein or pursuant to a duly approved amendment or change order.

**Sec. 3. Complete Work without Extra Cost.** Unless otherwise provided, the Contractor shall obtain and provide, without additional cost to the City, all labor, materials, equipment, transportation, facilities, services, permits, and licenses necessary to perform the Work.

**Sec. 4. Compensation.** The City shall pay the Contractor for the Work as described in this paragraph below OR as described in Exhibit "A" attached. In the event of a conflict, the provisions of this paragraph shall control. Any additional expenses or charges shall only be paid after both the City and the Contractor agree to and execute a written change order. The City shall not be obligated to pay the Contractor any fees, payments, expenses or compensation other than those authorized in this Contract or in a duly-approved change order. All payments shall be deemed inclusive of tax and other obligations.

**Sec. 4a. Retainage.** The City shall withhold no retainage on Contracts having a "total project cost" of less than \$100,000.00. The City may withhold retainage on contracts having a total project cost between \$100,000 and \$200,000. The City shall withhold retainage on contracts whose total project cost exceeds \$300,000. When withheld, retainage shall equal no more than five percent of each progress payment. When the project is fifty per cent complete, the City shall not retain anything from future project payments provided that (i) the surety concurs in writing, (ii) the Contractor continues to perform satisfactorily, (iii) any non-conforming work identified in writing by the architect, engineer(s) or City has been corrected by the Contractor and accepted by the architect, engineer(s) or City. However, if the City determines that the Contractor's performance is unsatisfactory, the City may withhold up to five percent retainage from each project payment. The City may withhold additional amounts above five percent for unsatisfactory job progress, defective construction not remedied, disputed work, third party claims filed against the owner or reasonable evidence that a third-party claim will be filed.

Definitions:

"Total Project Cost": Total value of the Contract and any approved change orders or amendments.

**“Project is Fifty Percent Complete”**: When the Contractor’s validly-issued gross project invoices (excluding the value of the materials stored off-site) equal or exceed fifty percent of the value of the Contract, except that the value of materials stored on-site shall not exceed twenty percent of the Contractor’s gross project invoices for the purpose of determining whether the project is fifty percent complete.

**Sec. 5. Term.** The Contractor shall commence work within ten (10) days of the date of its receipt of written Notice to Proceed from the City. The date that is ten (10) days from the date of the Contractor’s receipt of the Notice to Proceed shall be the “Commencement Date.” All work as set forth in the Scope of Services in Exhibit “A” shall be completed within **Seven-hundred-Thirty (730)** calendar days of the Commencement Date. The date that is **Seven-hundred-Thirty (730)** calendar days from the Commencement Date shall be the “Completion Date.” Time is of the essence with regard to this Project. If Contractor’s obligations are not completed by the Completion Date, the City reserves the right to nullify this Agreement, order the Contractor to immediately cease all work under this Agreement and vacate the premises, and to seek professional services equivalent to those outlined in Exhibit “A.” The Contractor shall be held accountable for all damages incurred by the City as a consequence of the missed Completion Date. The exercise of any of these rights by the City shall not be interpreted to prejudice any other rights the City may have under this Agreement or in law or equity. This Contract shall not be automatically extended unless agreed to in writing by the City or as provided in Exhibit “A”.

**Sec. 6. Contractor’s Billings to City.** Payments will be made in accordance with the schedule found in this section below OR attached at Exhibit “A”. Contractor shall submit an original pay request (invoice) to the City Purchasing Agent by the first of each month in order to expedite payment. Upon receipt of the request the City Purchasing Agent shall verify the amounts and if correct forward the request to the Accounts Receivable Division of the Finance Dept. Final payment on the Contract shall be made in 45 days, except in the case of retainage. Within 60 days after the submission of the final pay request, the City (with the written consent of the surety) shall release to the Contractor all retainage payments IF the City receives a certificate of substantial completion from the architect, engineer or designer-in-charge of the project OR the City receives beneficial occupancy and use of the project. In either case, the City may retain up to 2.5 times the estimated value of the work to be completed or corrected.

**Sec. 7. Insurance.** Contractor shall maintain and cause all sub-contractors to maintain insurance policies at all times with minimum limits as follows:

<u>Coverage</u>	<u>Minimum Limits</u>
Workers’ Compensation	\$500,000 each accident, \$500,000 bodily injury by disease each employee, \$500,000 bodily injury by disease policy limit
General Liability	\$1,000,000 per occurrence regardless of the contract size
Automobile Liability	\$1,000,000 per occurrence regardless of the contract size
Umbrella	<input type="checkbox"/> \$1,000,000 per occurrence if contract does not exceed 180 days and does not exceed \$500,000; otherwise,
	<input type="checkbox"/> \$2,000,000 per occurrence

Contractor shall provide a Certificate of Insurance to the City listing the City as an additional insured. Such Certificate shall be in a form acceptable to the City.

**Sec. 8. Documentation Requirements:**

A. Contractor shall provide the City with a **Certificate of Insurance** for review prior to the issuance of any contract or Purchase Order. All Certificates of Insurance will require written notice by the insurer or Contractor’s agent in the event of cancellation, reduction or other modifications of coverage by the insurer. Such notice shall be not less than 30 days for nonrenewal by the insurer, not less than 10 days for cancellation due to nonpayment of the premium and as soon as possible for all other types of modifications. In addition to the notice requirement above, Contractor shall provide the City with written notice of cancellation, reduction, or other modification of coverage of insurance whether instigated by the insurer or by the Contractor immediately upon Contractor’s receipt of knowledge of such modifications. Upon failure of the Contractor to provide such notice, Contractor assumes sole responsibility

for all losses incurred by the City for which insurance would have provided coverage. The insurance certificate shall be for the insured period in which the initial contract period begins and shall be renewed by the Contractor for each subsequent renewal period of the insurance for so long as the contract remains in effect.

The City shall be named as an **additional insured** on all policies except Workers' Compensation and it is required that coverage be placed with "A" rated insurance companies acceptable to the City. Statement should read, "City of Concord is added as an additional insured as evidenced by an endorsement attached to this certificate." Failure to maintain the required insurance in force may be cause for termination of this Agreement. In the event that the Contractor fails to maintain and keep in force the insurance herein required, the City has the right to cancel and terminate the Agreement without notice.

B. Contractor shall provide a completed W-9 form to the City prior to execution by the City of this Agreement.

**Sec. 9. Performance of Work by Contractor.**

(a) The Contractor warrants that all work performed under this Contract conforms to the Contract requirements and is free of any defect in equipment, material, or design furnished, or workmanship performed by the Contractor or any subcontractor or supplier at any tier. This warranty shall continue for a period of 1 year from the date of issuance by the City of written final completion of the work.

(b) The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to City - owned or controlled real or personal property, when that damage is the result of--

(1) The Contractor's failure to conform to contract requirements; or

(2) Any defect of equipment, material, workmanship, or design furnished.

(c) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for 1 year from the date of repair or replacement.

(d) The City shall notify the Contractor, in writing, within a reasonable time, not to exceed 30 days, after the discovery of any failure, defect, or damage.

(e) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time, not to exceed 30 days unless otherwise agreed in writing and signed by the City Manager or his designee, after receipt of notice, the City shall have the right to replace repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

(f) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this Contract, the Contractor shall--

(1) Obtain all warranties that would be given in normal commercial practice,

(2) Require all warranties to be executed, in writing, for the benefit of the City, if directed to do so by the City; and

(3) Enforce all warranties for the benefit of the City, if directed to do so by the City

(g) In the event the Contractor's warranty has expired, the City may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

(h) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the City nor for the repair of any damage that results from any defect in City-furnished material or design.

**Sec. 10. Performance of Work by City.** If the Contractor fails to perform the Work in accordance with the schedule referred to in Exhibit “A”, the City may, in its discretion, perform or cause to be performed some or all of the Work, and doing so shall not waive any of the City’s rights and remedies. Before doing so, the City shall give the Contractor reasonable notice of its intention. The Contractor shall reimburse the City for all costs incurred by the City in exercising its right to perform or cause to be performed some or all of the Work pursuant to this section.

**Sec. 11. Attachments.** Additional exhibits may be used to further define this Agreement when the Contractor and City so agree. Any additional exhibits shall be designated as exhibits to the Agreement with capitalized, sequential letters of the alphabet, shall be attached hereto and incorporated herein by reference as if the same were fully recited, and shall become terms of this Agreement upon execution by both parties.

*The following attachments* are made a part of this Contract and incorporated herein by reference:

- (a) Exhibit “A” – Bid Form
- (b) Exhibit “B” – Standard Form of Performance Bond
- (c) Exhibit “C” – Special Provisions
- (d) Exhibit “D” – Contractor must execute the Affidavit attached as Exhibit D, attesting to compliance with state and federal laws related to E-Verify.
- (e) Exhibit “E” – Tax Form(s).
- (f) Exhibit “F” – Certificate of Insurance.
- (g) Exhibit “G” - Drawings

In case of conflict between an attachment and the text of this contract excluding the attachment, the text of this contract shall control. Any attachment that materially alters the standard terms contained herein must be reviewed by the City Attorney and approved by the City in writing.

**Sec. 12. Notice.** (a) All notices and other communications required or permitted by this Contract shall be in writing and shall be given either by personal delivery, fax, or certified United States mail, return receipt requested, addressed as follows:

To the City:

Jacklyn Deal, Director of Engineering  
City of Concord  
P.O. Box 308  
Concord, NC 28026  
Fax Number: (704) 786-4521

To the Contractor:

VaLerie Kolczynski, Esq.  
City Attorney  
PO Box 308  
Concord, NC 28026  
Fax Number: (704) 784-1791

(b) **Change of Address, Date Notice Deemed Given:** A change of address, fax number, or person to receive notice may be made by either party by notice given to the other party. Any notice or other communication under this Contract shall be deemed given at the time of actual delivery, if it is personally delivered or sent by fax. If the notice or other communication is sent by US Mail, it shall be deemed given upon the third calendar day following the day on which such notice or other communication is deposited with the US Postal Service or upon actual delivery, whichever first occurs.

**Sec. 13. Indemnification.** To the maximum extent allowed by law, the Contractor shall defend, indemnify, and save harmless the City of Concord, its agents, officers, and employees, from and against all charges that arise in any manner from, in connection with, or out of this Contract as a result of the acts or omissions of the Contractor or subcontractors or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable except for damage or injury caused solely by the negligence of the City its agents, officers, or employees. In performing its duties under this section, the Contractor shall at its sole expense defend the City of Concord, its agents, officers, and employees with legal counsel reasonably acceptable to City. As used in this subsection – “Charges” means claims, judgments, costs, damages, losses, demands, liabilities, duties, obligations, fines, penalties, royalties, settlements, expenses, interest, reasonable attorney’s fees, and amounts for alleged violations of sedimentation pollution, erosion control, pollution, or other environmental laws, regulations, ordinances, rules, or orders. Nothing in this section shall affect any warranties in favor of the City that are otherwise provided in or arise out of this Contract. This section is in

addition to and shall be construed separately from any other indemnification provisions that may be in this Contract. This section shall remain in force despite termination of this Contract (whether by expiration of the term or otherwise) and termination of the services of the Contract under this Contract.

**Sec. 14. Corporate Status.** If the Contractor is dissolved or suspended and the Contractor does not notify the City of such dissolution within three (3) business days from date of dissolution or suspension, and/or the corporate status is not reinstated within thirty (30) days, this Contract, at the sole option of the City and without prejudice to City's other remedies, shall be declared null and void or the Contractor shall execute a new contract showing the Contractor's correct legal entity.

**Sec. 15. Miscellaneous.**

(a) Choice of Law and Forum. This Contract shall be deemed made in Cabarrus County, North Carolina. This Contract shall be governed by and construed in accordance with the laws of North Carolina. The exclusive forum and venue for all actions arising out of this Contract shall be the appropriate division of the North Carolina General Court of Justice, in Cabarrus County. Such actions shall neither be commenced in nor removed to federal court. This section shall not apply to subsequent actions to enforce a judgment entered in actions heard pursuant to this section.

(b) Waiver. No action or failure to act by the City shall constitute a waiver of any of its rights or remedies that arise out of this Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

(c) Performance of Government Functions. Nothing contained in this Contract shall be deemed or construed so as to in any way estop, limit, or impair the City from exercising or performing any regulatory, policing, legislative, governmental, or other powers or functions.

(d) Severability. If any provision of this Contract shall be unenforceable, the remainder of this Contract shall be enforceable to the extent permitted by law.

(e) Assignment, Successors and Assigns. Without the City's written consent, the Contractor shall not assign (which includes to delegate) any of its rights (including the right to payment) or duties that arise out of this Contract. Unless the City otherwise agrees in writing, the Contractor and all assigns shall be subject to all of the City's defenses and shall be liable for all of the Contractor's duties that arise out of this Contract and all of the City's claims that arise out of this Contract. Without granting the Contractor the right to assign, it is agreed that the duties of the Contractor that arise out of this Contract shall be binding upon it and its heirs, personal representatives, successors, and assigns.

(f) Compliance with Law. In performing all of the Work, the Contractor shall comply with all applicable law. Without limitation, Contractor shall comply with the requirements of Article 2, Chapter 64 (Verification of Work Authorization) of the North Carolina General Statutes relating to E-Verify. Further, if Contractor utilizes a subcontractor, Contractor shall require the subcontractor to comply with the requirements of Article 2 of Chapter 64 of the General Statutes. Pursuant to the requirements of the Iran Divestment Act, N.C.G.S. § 143C-6A-1, et. seq., Contractor certifies that that as of the Effective Date of this Agreement, Contractor is not on the Final Divestment List as created by the State Treasurer in compliance with N.C.G.S. § 143-6A-4 and located at [www.nctreasurer.com/Iran](http://www.nctreasurer.com/Iran). Furthermore, Contractor agrees that it will not enter into any subcontracts for the performance of this Agreement with any entity on the Final Divestment List.

(g) City Policy. THE CITY OPPOSES DISCRIMINATION ON THE BASIS OF RACE AND SEX AND URGES ALL OF ITS CONTRACTORS TO PROVIDE A FAIR OPPORTUNITY FOR MINORITIES AND WOMEN TO PARTICIPATE IN THEIR WORK FORCE AND AS SUBCONTRACTORS AND VENDORS UNDER CITY CONTRACTS.

(h) EEO Provisions. During the performance of this Contract the Contractor agrees as follows:  
(1) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, political affiliation or belief, age, or disability. The Contractor shall take affirmative action to insure that applicants are employed and that employees are treated equally during employment, without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or disability. The Contractor shall post in conspicuous places available to employees and applicants for employment, notices setting forth these EEO provisions. (2) The Contractor in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, political affiliation or belief, age, or disability.

(i) No Third Party Right Created. This Contract is intended for the benefit of the City and the Contractor and not any other person.

(j) Principles of Interpretation. In this Contract, unless the context requires otherwise the singular includes the plural and the plural the singular. The pronouns "it" and "its" include the masculine and feminine. Reference to

statutes or regulations include all statutory or regulatory provisions consolidating, amending, or replacing the statute or regulation. References to contracts and agreements shall be deemed to include all amendments to them. The word “person” includes natural persons, firms, companies associations, partnerships, trusts, corporations, governmental agencies and units, and any other legal entities.

(k) Modifications, Entire Agreement. A modification of this Contract is not valid unless signed by both parties and otherwise in accordance with requirements of law. Further, a modification is not enforceable against the City unless the City Manager or other duly authorized official signs it for the City. This Contract contains the entire agreement between the parties pertaining to the subject matter of this Contract. With respect to that subject matter, there are no promises, agreements, conditions, inducements, warranties, or understandings, written or oral, expressed or implied, between the parties, other than as set forth or referenced in this Contract.

(l) Corporate Seal. If a corporate seal is included by any party to this Contract, it is only for authentication purposes. This Contract is not signed under seal.

(m) No Employment Relationship. For all matters relating to this Agreement, Contractor shall be deemed an Independent Contractor. Nothing in this Agreement shall be construed in such a manner as to create an employee-employer relationship between City and Contractor.

**(The following section applies to construction contracts only if the total amount of contracts awarded for the project is \$300,000 or more.)**

**Sec. 16. Bonding.** Both performance and payment bonds for the full amount of this Contract are required to be attached. Instead of bonds, you may submit a deposit of money, certified check or government securities for the full amount of the Contract. The performance bond shall have a value equal to 100% of this Contract. This bond shall be conditioned upon faithful performance of the Contract in accordance with the plans, specifications and conditions of the Contract. The performance bond shall be solely for the protection of the City. The payment bond shall be in an amount equal to 100% of the Contract, and conditioned upon the prompt payment for all labor or materials for which a contractor or subcontractor is liable. The payment bond shall be solely for the protection of the persons furnishing materials or performing labor for which a contractor, subcontractor or construction manager at risk is liable.

When the total amount of contracts awarded for any project exceeds three hundred thousand dollars (\$300,000), performance and payment bonds are required from any contractor or construction manager at risk with a contract amount of or exceeding fifty thousand dollars (\$50,000).

**Sec. 17. Dispute Resolution.** It is understood and agreed that NCGS 143-128(f1-g) requires that disputes arising under an agreement for the erection, construction, alteration or repair of a building be subject to a dispute resolution process specified by the City. The amount in controversy shall be at least \$15,000.00 before this dispute resolution procedure may be used. In compliance with this statutory provision, the City specifies this Section as the dispute resolution process to be used on this Project. It is further understood and agreed that this dispute resolution process is based on non-binding mediation and will only be effective to the extent that the Parties to any mediated dispute participate in the mediation in good faith. It is also understood and agreed that the City is under no obligation under any circumstance to secure or enforce the participation of any other Party in the mediation of any dispute subject to this Section and NCGS 143-128(f1-g).

**This Section 17 does not apply to:**

- (a) The purchase and erection of prefabricated or relocatable buildings or portions of such buildings, except that portion of the work that must be performed at the construction site; or**
- (b) The erection, construction alteration or repair of a building when the cost of such building is \$300,000 or less.**

17.1 Any dispute arising between or among the Parties listed in Section 17.3 that arises from an agreement to construct the Project, including without limitation a breach of such agreement, shall be subject to non-binding mediation administered by the American Arbitration Association under its Construction Industry Mediation Rules (“Rules”), except as otherwise expressly set forth in this Section. To the extent any provision of the Rules is inconsistent with the provisions of this Section, the provisions of this Section shall control. The mediation provided in this Section shall be used pursuant to this Agreement and NCGS 143-128(f1-g) and is in lieu of any dispute resolution process adopted by the North Carolina State Building Commission, which process shall not apply to this Project.

17.2 For purposes of this Section the following definitions shall apply:

- a. *Agreement to construct the Project* means an agreement to construct the Project that is subject to the requirements of NCGS 143-128 and does not include any agreement related to the Project that is not subject to said statute.
- b. *Construct* or *construction* refers to and includes the erection, construction, alteration or repair of the Project.
- c. *Party* or *Parties* refers to the parties listed in Section 16.4.
- d. *Project* means the building to be erected, constructed, altered or repaired pursuant to this Agreement.

17.3 The City and any Party contracting with the City or with any first-tier or lower-tier subcontractor for the construction of the Project agree to participate in good faith in any mediation of a dispute subject to this Section and NCGS 143-128(f1-g), including without limitation the following Parties (if any): architect(s), engineer(s), surveyor(s), construction manager, construction manager at risk, prime contractor(s), surety(ies), subcontractor(s), and supplier(s).

17.4 In order to facilitate compliance with NCGS 143-128(f1-g), the Contractor and all other Parties shall include this Section 17 in every agreement to which it (any of them) is a Party for the construction of the Project without variation or exception. Failure to do so will constitute a breach of this Agreement, and the Contractor or other Party failing to include this Section in any agreement required by this Section shall indemnify and hold harmless the remaining Parties from and against any and all claims, including without limitation reasonable attorney fees and other costs of litigation, arising in any manner from such breach. Notwithstanding the foregoing provisions of this Section, it is expressly understood and agreed that the Parties are intended to be and shall be third-party beneficiaries of the provisions of this Section and can enforce the provisions hereof.

17.5 The following disputes are not subject to mediation: (i) a dispute seeking a non-monetary recovery; and (ii) a dispute seeking a monetary recovery of \$15,000 or less.

17.6 A dispute seeking the extension of any time limit set forth in an agreement to construct the Project shall be subject to mediation pursuant to this Section and NCGS 143-128(f1-g), but only if the damages which would be suffered by the Party seeking the extension would exceed \$15,000 if the disputed extension is denied. To the extent that liquidated damages are set forth in such agreement as the measurement of damages for failure by such Party to meet such time limit, such liquidated damages shall be the exclusive standard for determining the amount of damages associated with such dispute.

17.7 For purposes of this Section, a dispute is limited to the recovery of monetary damages from the same transaction or occurrence against a single Party or two or more Parties alleged to be liable jointly, severally or in the alternative. Two or more disputes may not be consolidated or otherwise combined without the consent of all Parties to such disputes.

17.8 In addition to such matters as are required by the Rules, a request for mediation shall include the amount of the monetary relief requested.

17.9 Prior to requesting mediation, a Party must form a good faith belief that it is entitled under applicable law to recover the monetary amount to be included in the request from one or more of the remaining Parties. Such belief must be based on a reasonable and prudent investigation into the dispute that is the subject of the request. The request for mediation must be based on such investigation and may not include any amount or the name of any remaining Party, unless supported by such investigation and good faith belief by the Party requesting the mediation.

17.10 If a Party breaches any provision of Section 17.9, it shall indemnify and hold harmless all other Parties from any costs, including reasonable attorney fees and other costs of litigation, and damages incurred by such other Parties that arise from such breach.



17.11 All expenses incurred by a Party to a dispute in preparing and presenting any claim or defense at the mediation shall be paid by the Party. Such expenses include without limitation preparation and production of witnesses and exhibits and attorney fees. All other expenses of the mediation, including filing fees and required traveling and other expenses of the mediator, shall be borne as follows: one half by the Party requesting the mediation, with the remaining parties paying equal shares of the remaining expenses and costs; provided that, if the City is named as a party to the mediation, the City shall pay at least one-third of the mediation expenses and costs divided among the Parties. If more than one Party to a dispute requests a mediation, the mediation expenses and costs to be divided among the Parties shall be borne equally by the Parties to the dispute; provided that, if the City is named as a Party to the mediation, the City shall pay at least one-third of the mediation expenses and costs divided among the Parties.

17.12 The mediation shall be held at a location agreeable to the mediator and all of the Parties; provided that, if no agreement can be reached, the mediation will be held at such location in Cabarrus County as the mediator shall determine.

17.13 The provisions of this Section are subject to any other provision of this Agreement concerning the submission, documentation and/or proof of any claim or dispute. Such other provisions shall apply in full force and shall be satisfied as a condition precedent to mediation pursuant to this Section.

17.14 The Parties understand and agree that mediation in accordance with this Section shall be a condition precedent to institution of any legal or equitable proceeding seeking monetary recovery based on any dispute that is subject to mediation pursuant to this Section.

**Sec. 18. Breach.** In the event of a violation of any material term of this Agreement, the non-violating party may terminate the Agreement upon written notice. Such notice shall state the violation with specificity and shall give ten (10) days to cure the violation. The cure period shall be measured as ten (10) days from the date of receipt of notice by the violating party, or, if the date is not known, then thirteen (13) days from the date the notice is placed in the United States Post. If the violation remains uncorrected at the end of the cure period, the Agreement shall be terminated without any further action by the non-violating party. Any remaining disputes shall be subject to the dispute resolution procedure set forth above, if applicable.

[Signature Page to Follow]

IN WITNESS WHEREOF, the City of Concord and the Contractor have caused this Contract to be executed by their respective duly authorized agents or officers.

CITY OF CONCORD:

(Typed or Printed Legal Name of Contractor)

By: \_\_\_\_\_  
City Manager

By: \_\_\_\_\_  
Signature of President/Vice President/Manager/Partner

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

Printed Name: \_\_\_\_\_

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

ATTEST BY:

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

\_\_\_\_\_  
City Clerk

ATTEST:

BY: \_\_\_\_\_  
Signature of Vice President, Secretary, or other officer

APPROVED AS TO FORM:

Printed Name: \_\_\_\_\_

Title \_\_\_\_\_

\_\_\_\_\_  
Attorney for the City of Concord

SEAL

**APPROVAL BY CITY FINANCE OFFICER**

This instrument has been pre-audited in the manner required by the Local Government Budget and Fiscal Control Act.

\_\_\_\_\_  
Signature

EXHIBIT "D"

STATE OF NORTH CAROLINA

AFFIDAVIT

COUNTY OF CABARRUS

\*\*\*\*\*

I, \_\_\_\_\_ (the individual signing below), being duly authorized by and on behalf of \_\_\_\_\_ (the legal name of the entity entering the contract, "Employer")

after first being duly sworn hereby swears or affirms as follows:

- 1. Employer understands that E-Verify is the federal E-Verify program operated by the United States Department of Homeland Security and other federal agencies, or any successor or equivalent program used to verify the work authorization of newly hired employees pursuant to federal law in accordance with NCGS §64-26.
2. Employer understands that Employers Must Use E-Verify. Each employer (as such term is defined in NCGS § 64-25), after hiring an employee (as such term is defined in NCGS § 64-25) to work in the United States, shall verify the work authorization of the employee through E-Verify in accordance with NCGS§64-26(a). Employer attests that Employer is in compliance with the requirements of the federal and state laws relevant to E-verify.
3. Employer is a person, business entity, or other organization that transacts business in the State of North Carolina. Employer employs 25 or more employees in this State. (mark Yes or No)
a. YES \_\_\_\_\_, or b. NO \_\_\_\_\_.
4. Employer attests that all subcontractors employed by it as part of this contract comply with the requirements of E-Verify, and Employer will ensure compliance with E-Verify by any subcontractors subsequently hired by Employer as part of any contract with the City of Concord.
5. Employer shall have a continuing duty to inform the City of Concord of any changes to this sworn information.

This \_\_\_ day of \_\_\_\_\_, 20\_\_.

Signature of Affiant \_\_\_\_\_
Print or Type Name: \_\_\_\_\_

State of North Carolina County of Cabarrus
Signed and sworn to (or affirmed) before me, this the \_\_\_
day of \_\_\_\_\_, 20\_\_\_.
My Commission Expires:

\_\_\_\_\_  
\_\_\_\_\_

Notary Public

(Affix Official/Notarial Seal)

**EXHIBIT “E”**

**TAX FORM(S)**

**EXHIBIT “F”**

**CERTIFICATE OF INSURANCE**

4824-4465-9749, v. 1

City of Concord  
 Post Office Box 308  
 Concord, North Carolina 28026-0308



For City Use Only  
 Charge to PO #

Project Name	
Date Notice to Proceed	
Final Completion Date	
Days Remaining in Contract	
Percent Work Complete	
Percent Time Complete	
Percent Payment Complete	

APPLICATION FOR PAYMENT NO.  
 PERIOD FROM: TO:

**CERTIFICATE OF THE CONTRACTOR**

To the best of my knowledge and belief, I certify that this periodical estimate is correct and all work has been performed and materials supplied in full accordance with the terms and conditions of the contract documents between the undersigned contractor and the City of Concord.

GROSS AMOUNT OF PARTIAL PAYMENT		\$
RETAINAGE AT 5.0000%	\$	
PREVIOUS PAYMENTS	\$	
LIQUIDATION DAMAGES 0.00 DAYS AT \$0.00 PER DAY, \$0.00 this period.	\$	
OTHER DEDUCTIONS \$0.00 this period.	\$	
TOTAL DEDUCTIONS		\$
NET AMOUNT DUE THIS ESTIMATE		\$

Name of Contractor: \_\_\_\_\_ Address: \_\_\_\_\_  
 Signed: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

**CERTIFICATE OF CONSTRUCTION ADMINISTRATOR/ENGINEER**

I certify that I have verified this periodical estimate and that to best of my knowledge and belief, it is a true and correct statement of work performed and materials supplied under the contract.

Consultant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_  
 Engineering Construction Manager: \_\_\_\_\_ Date: \_\_\_\_\_

**APPROVED AND PAYMENT RECOMMENDED: CITY OF CONCORD**

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

Engineering's Application for Payment  
Form

Project Title: **J.E Jim Ramseur Park**  
**Project No. 2022-080**

ITEM	DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL PRICE	QUANT. THIS EST.	TOTAL THIS EST.	QUANT. PREV. EST.	TOTAL PREVIOUS	QUANT. TO DATE	TOTAL TO DATE	QUANT. DIFF.	TOTAL DIFF.
1			LF	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
2			LF	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
3			LF	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
4			LF	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
5			LF	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
6			LF	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
7				\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
8			EA	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
9			LBS	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
10			SF	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
11			SF	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
12			LF	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
13												
a			EA	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
b			EA	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
c			EA	\$ -		\$ -		\$ -	0.00	\$ -	0.00	\$0.00
Add 1			EA			\$ -		\$ -	0.00	\$ -	0.00	\$0.00
Add 2			LS			\$ -		\$ -	0.00	\$ -	0.00	\$0.00
Add 3			LF			\$ -		\$ -	0.00	\$ -	0.00	\$0.00
Add 4			SY			\$ -		\$ -	0.00	\$ -	0.00	\$0.00
Add 5			SY			\$ -		\$ -	0.00	\$ -	0.00	\$0.00
	<b>Base Bid</b>	<b>\$</b>				\$ -		\$ -		\$ -		\$0.00
	<b>10 % Contingency</b>	<b>\$</b>				\$ -						\$ -
	<b>Total Base Bid</b>	<b>\$</b>				\$ -						\$0.00

CITY OF CONCORD  
CONCORD, NORTH CAROLINA  
CONTRACT CHANGE ORDER

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

Project Title: J.E. Jim Ramseur Park

Project #: 2022-080

Owner: City of Concord

Change Order No.

To:

(CONTRACTOR)

Account No.

Purchase Order No.

You are hereby requested to make the following changes in this Contract to comply with the provisions of the attached and/or the original Contract Documents.

Item No.	Description of Changes	Additions	Deductions	
		\$0.00	\$0.00	
Original Contract Amount				
Net Changes by Previous Change Orders				
Net Changes this Change Order				\$0.00
New Contract Amount				\$0.00

The Contract Time will be \_\_\_\_\_ by \_\_\_\_\_ calendar days.

The Completion Date as of this Change Order is:

Accepted: (Contractor)

By:

Date:

Accepted: CITY OF CONCORD

By:

Date:

This instrument has been pre-audited in the manner required by Local Government Budget and Fiscal Control Act.

By:

Finance Director

Date:



## Certificate of Infrastructure Completion

Project Name & Number: <b>J.E. Jim Ramseur Park</b>		Project #: <b>2022-080</b>	
Contractor Name & Address:		Owner Name & Address:	
Miscellaneous Information:			
Inspector:		Signature:	

The following items have been inspected, reviewed and found to be complete in substantial accordance with the approved plans and specifications. The dates of completion are those agreed upon by the City of Concord when all construction Work and testing was completed. These dates DO NOT initiate the start of any Warranty periods of said item(s). Warranty periods shall begin as specified on the CERTIFICATION OF FINAL COMPLETION.

Sanitary Sewer:	Approved:		
	Initial:	Date:	
Potable Water:	Approved:		
	Initial:	Date:	
Storm Water:	Approved:		
	Initial:	Date:	
Asphalt Base Course:	Approved:		
	Initial:	Date:	
Asphalt Surface Course:	Approved:		
	Initial:	Date:	
Curb & Gutter	Approved:		
	Initial:	Date:	
Sidewalks:	Approved:		
	Initial:	Date:	
Street Trees:	Approved:		
	Initial:	Date:	
Other:	Approved:		
	Initial:	Date:	

**Engineering**

Phone (704) 920-5425 • Fax (704) 786-4521

**FIELD ORDER**

**CITY OF CONCORD  
ENGINEERING DEPARTMENT**

Post Office Box 308  
Concord, North Carolina 28026-0308

Project Title: **J.E. Jim Ramseur Park** Project No. **2022-080**

FIELD ORDER NO \_\_\_\_\_ CONTRACT \_\_\_\_\_ DATE \_\_\_\_\_

PROJECT \_\_\_\_\_

LOCATION \_\_\_\_\_

TO: \_\_\_\_\_

\_\_\_\_\_

=====

THIS ORDER AUTHORIZES YOU TO PROCEED WITH THE ALTERATIONS AND/OR ADDITIONS TO THE WORK AS DESCRIBED HEREIN, IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF OUR STANDARD FORM OF CONTRACT.

**DESCRIPTION OF WORK:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

- QUOTATION RECEIVED AND APPROVED BY THE CITY OF CONCORD.
- QUOTATION NOT RECEIVED. PLEASE FURNISH QUOTATION IMMEDIATELY TO THE CITY OF CONCORD FOR CHECK AND APPROVAL.
- TIME AND MATERIAL BASIS. FURNISH TIME AND MATERIAL REPORTS DAILY TO THE CITY OF CONCORD FOR VERIFICATION AND SIGNATURE.
- OTHER \_\_\_\_\_

AUTHORIZED BY: \_\_\_\_\_



North Carolina One Call Center, Inc.

North Carolina One Call Center, Inc., a non-profit organization funded by participating utility companies and municipalities in the interest of community and job safety and improved service through damage reduction to the utilities.

**A ONE CALL TOLL FREE TELEPHONE NUMBER, 811 or 1-800-632-4949, PROVIDES AN AVENUE TO ALL OF THE PARTICIPATING MEMBERS FROM ANY POINT WITHIN THE STATE OF NORTH CAROLINA.**

Anyone proposing to excavate, dig, bore, tunnel, blast or disturb the earth in any manner in which buried utilities may be damaged is requested to call the toll-free number between the hours of 6:00 a.m. and 10:00 p.m., Monday through Friday, forty-eight hours before starting the proposed work.

Within minutes of your telephone call, the participating members will be made aware of your plans and will be given pertinent information that has been provided by you about your planned work. You will be told the names of the participating members from whom you can expect a response - if there are buried facilities in the path of your activity, the route of the utilities will be staked and/or marked at no expense to you. If there are no facilities in the area of the planned work, you will be called or notified by a representative of a participating company accordingly.

Should a non-participating utility operator be serving your area, we recommend that you call them on an individual basis. All utility operators, whether company or municipality, will be provided an opportunity to become a member of North Carolina One Call Center, Inc.

Naturally, knowing the route of utilities, the excavator is expected to exercise caution and to avoid damage as the project progresses.

Damage prevention does not just happen – it is a planned and orderly process through which each of us can participate - **YES, WE CAN AND WE WILL DRAMATICALLY REDUCE DAMAGES TO THE UTILITIES IN THE STATE OF NORTH CAROLINA!! THANKS FOR YOUR HELP.**

**BEFORE YOU DIG**

IN THE INTEREST OF COMMUNITY AND JOB SAFETY AND IMPROVED SERVICE

**CALL NORTH CAROLINA ONE CALL CENTER, INC.**

**811 or 1-800-632-4949**

**North Carolina One Call Center, Inc  
2300 West Meadowview Rd., Suite 227  
Greensboro, NC 27407  
www.nc811.org**

## SECTION II

# **GENERAL CONDITIONS**

**Please reference Horizontal Conditions online at:**

<https://concordnc.gov/Portals/0/Concord/Departments/Engineering/Documents/Old%20Site%20Standards/10%2001%2005%20General%20Conditions%20Horizontal.pdf?ver=D9zcv1hzhv5VHaH11P4Ntg%3d%3d>

**Please reference Vertical Conditions online at:**

<https://concordnc.gov/Portals/0/Concord/Departments/Engineering/Documents/Old%20Site%20Standards/10%2001%2008%20GENERAL%20PROVISIONS%20Vertical%20Construction.pdf?ver=RFc9qXcwcYckxj7yRIwJuA%3d%3d>

## **SP, COMPREHENSIVE GRADING**

### **1.0 DESCRIPTION**

This item shall include all elements of work covered by the referenced NCDOT Specifications and the numbered Additional City Specifications provided herein.

#### **NCDOT Specifications**

200, "Clearing and Grubbing"  
225, "Roadway Excavation"  
230, "Borrow Excavation"  
235, "Embankments"  
240, "Ditch Excavation"  
250, "Removal of Existing Pavement"  
260, "Proof Rolling"  
340, "Pipe Removal"  
412, "Unclassified Structure Excavation"  
416, "Channel Excavation"  
500, "Fine Grading, Sub-grade, Shoulders and Ditches"  
545, "Incidental Stone Base"  
560, "Shoulder Construction"  
1530, "Abandon or Remove Utilities"

#### **Additional City Specifications**

1. Clearing and Grubbing: Clearing on this Project shall be performed to the slope stake line or the right-of-way or easement lines unless directed otherwise. The Contractor shall remove all trees in the easement areas.
2. Traffic Bearing Road Plates: The Contractor shall be responsible for all traffic bearing road plates needed in accordance with NCDOT Utility Cut Replacement Detail.
3. Fence Removal and Disposal and or Fence Relocation: as shown on the plans and any additional removal or relocation identified by the Contractor's means and methods shall be included in this item.
4. Hedgerow and or Planting Bed Removal and Disposal: as shown on the plans and any additional hedgerow or planting bed removal identified by the Contractor's means and methods shall be included in this item. Hedgerows to be removed shall be approved by the Engineer prior to removal.
5. Mail Boxes and Site Amenities: remove, protect, and reset mail boxes and site amenities. The Contractor shall keep mailboxes in service at all times and allow / provide for other services, including but not limited to trash pickup.

6. Existing Road Signs: remove, protect, and reset road signs. Repair or replace signs damaged in relocating. Erect signs and supports according to requirements of NCDOT Specifications 903 and 904.
7. Removal and Disposal of Existing Infrastructure: concrete curb, sidewalk, miscellaneous concrete, asphalt, driveways, pads, slabs, walls, culverts, structures, catch basins, manholes, etc. within the construction limits as shown on the plans and any additional infrastructure removal identified by the Contractor's means and methods, shall be included in this item.
8. Shoring: The Contractor shall be responsible for all shoring to include means, methods, materials and engineering needed to construct the project. Temporary shoring required in NCDOT's ROW will be covered and paid for by this item.
9. Saw Cutting: all saw cutting required to build the Project. Where asphalt or concrete (curb, sidewalk, roadway, driveways, parking lots, etc.) is to be removed, the Contractor shall provide a neat edge along the pavement being retained by sawing the pavement a minimum of 2" deep and 1' wide before breaking and removing adjacent pavement. When the Contractor proposes to saw pavement more than one foot from the proposed pavement (curb, sidewalk, structure, etc.), the Contractor shall obtain approval from the Engineer prior to saw cutting and removing pavement. The cost of sawing asphalt or concrete shall be included in this item.
10. Property Access: All labor and materials required to maintain access to properties during construction as directed by the Engineer.
11. Erosion Control Permit: All costs from EROSION & SEDIMENT CONTROL - FINANCIAL RESPONSIBILITY AND CERTIFICATE OF COVERAGE shall be included in this item.
12. Sidewalk and Curb Clean-up: The Contractor shall have all related sidewalk and curb work completed within ten (10) days of placement, including but not limited to 1) removal and disposal of construction debris; 2) related grading to include fine grading; 3) site restoration; 4) seedbed preparation and dress up work; 5) seeding and mulching; and 6) final cleaning.
13. Tree and/or Stump Removal and Disposal: as shown on the plans and any additional tree and/or stump removal identified by the Contractor's means and methods shall be included in this item. Trees to be removed shall be approved by the Engineer prior to removal.
14. Utility Pipe/Conduit Removal and Disposal: existing public or private utility pipe / conduit, subsurface and shoulder drain pipe removal and disposal as shown on the plans and any additional utility pipe / conduit removal identified by the Contractor's means and methods shall be included in this item.
15. Rock Excavation: all rock excavation required to build the project.
16. Unsuitable Material: Unsuitable soil material that must be hauled off from the site will be incidental to this lump sum Comprehensive Grading item. Suitable soils are defined as ASTM

D 2487 Soil Classification Groups SM, ML, SC, and CL, or a combination of these groups; free of rock or gravel larger than 2 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter. It is the contractor's responsibility to dry all soils to within 3% of optimum moisture before the determination of suitability is made. Final determination will be at the discretion of the Engineer. The Engineer should be consulted before any material is declared unsuitable and removed from the site.

17. Import Excavation: It is the responsibility of the contractor to verify site grading quantities from the provided drawings and files. Any import excavation required to satisfy the requirements of the grading and drainage plans will be incidental to this line item. **No separate payment will be made for any Borrow Excavation or Import Excavation. It is the Contractor's responsibility to review the provided Geotechnical report and recommendations. There will be no separate payment for undercut excavation, borrow excavation, or import excavation. All clearing, grubbing, and grading activities are incidental to this Comprehensive Grading line item.**

**Pages 10 and 11 of the Geotechnical report outline undercut recommendations that will be followed for foundations and pavements/slabs. If necessary, storm drain/utility undercut will follow the same recommendation as the pavements/slabs. There will be no separate payment for undercut excavation, which includes the backfill material imported to fill the undercut area. Please carefully review the attached Geotechnical report and recommendations. Scarification is encouraged where applicable as described on Page 11 of the Geotechnical Report.**

18. Erosion Control: includes but is not limited to furnishing, installing, and maintaining, silt fence, diversion ditches, rock inlet sediment traps, rock pipe sediment trap, silt sacks, all stone for erosion control, rock check dams, block and gravel and inlet protection, catch basin inlet protection, temporary rock construction entrances, silt basins, temporary matting and all other erosion control measures required by, the plans, current ordinances, project permitting, and the Contractor's means and methods.
19. Backfill of Asphalt/Concrete: Prior to completion of the project all curb, asphalt, and concrete must be backfilled and fine graded for positive drainage. There will be no separate payment for import excavation required for positive drainage behind asphalt trails, drives, or concrete sidewalks.

## **2.0 MEASUREMENT**

There will be no separate measurement made for Comprehensive Grading.

## **3.0 PAYMENT**



For the above-referenced NCDOT sections and numbered Additional City Specifications, there will be no direct measurement, payment or compensation, all cost incurred to complete the work as specified shall be included in the Lump Sum price bid for "Comprehensive Grading".

There will be **no separate measurement or payment** for the items listed or referenced in this specification.

Payment will be made under:

**COMPREHENSIVE GRADING .....LS**

## SECTION 011000 - SUMMARY

## PART 1 GENERAL

## 1.1 PROJECT

- A. Project Name: J.E. "Jim" Ramseur Park
- B. Owner's Name: City of Concord.
- C. Architect's Name: Woolpert of North Carolina, PLLC.
- D. Additional Project contact information is specified in Section 000103 - Project Directory.
- E. The Project consists of the demolition of existing site structures and construction of the new J.E. "Jim" Ramseur Park, including, but not limited to, sitework, park amenities, greenway, shelters, pickleball restroom building, splashpad pavilion/restroom building, basketball restroom building, and a maintenance building. The project includes sitework and vertical construction on the neighboring school property through agreement with the City.

## 1.2 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Notice of Award.

## 1.3 DESCRIPTION OF DEMOLITION WORK

- A. Scope of demolition and removal work is indicated on drawings and specified in Section 024100.
- B. Owner shall remove all items meant for salvage or reuse from the existing structures prior to start of work.

## 1.4 WORK BY OWNER

- A. Items noted OFOI will be furnished and installed by Owner after Date of Substantial Completion. Some items include:
  - 1. Furniture, Furnishings, and Equipment for Buildings, Site Furniture, Furnishings and Equipment as defined by drawings and Division 32, Exterior Improvements.
  - 2. Low voltage systems including, but not limited to, WI-FI, CCTV systems and equipment, cameras, and related support accessories.
  - 3. Toilet Accessories listed as OFOI in the drawings.
  - 4. Cleaning Supply Accessories.

1.5 FUTURE WORK

- A. Site is designed for future building construction of Phase II Recreation Center.
- B. Infrastructure is provided for future installation of sports lighting at pickleball courts.

1.6 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.

1.7 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations:
  - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
  - 2. Do not encroach delineated wetlands without permit.
- B. Arrange use of site and premises to allow:
  - 1. Work by Others.
- C. Provide access to and from site as required by law and by Owner:
  - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
  - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Utility Outages and Shutdown:
  - 1. Prevent accidental disruption of utility services to other facilities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SUMMARY

## SECTION 012500 - SUBSTITUTION PROCEDURES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions applicable following award of Contract.
- B. Related Requirements:
  - 1. Document 002600 "Procurement Substitution Procedures" for requests for substitution and for requests for approval of non-listed products submitted prior to award of Contract, to extent allowed by Instructions to Bidders.
  - 2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

## 1.3 DEFINITIONS

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

## 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit electronic copy of each request for consideration per requirements of Document 002113. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use CSI Form 13.1A or a facsimile of form provided in Project Manual, or equivalent form from Project Management Software acceptable to Architect.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

- a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
  - b. Coordination information, including a list of changes or revisions needed to other parts of the Work that will be necessary to accommodate proposed substitution.
  - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
  - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 5 days of receipt of request.
    - a. Forms of Acceptance: Change Order, Work Order, or Proposed Modification for minor changes in the Work.
    - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

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

## 1.6 PROCEDURES

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

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 5 days prior to time required for preparation and review of related submittals.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.
    - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

## PART 3 - EXECUTION (Not Used)

END OF DOCUMENT

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## SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

## PART 1 - GENERAL

## 1.1 Related Documents

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions of the Contract and other Division-1 Specification Sections, apply to this section.

## 1.2 Summary

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

## 1.3 Minor Changes in the Work

- A. Supplemental instructions authorizing minor changes in the Work, not involving an adjustment to the Contract Sum or Contract Time, will be issued by the Architect.
  - 1. Proposal requests issued by the Architect are for information only. Do not consider them an instruction either to stop work in progress, or to execute the proposed change.
  - 2. Unless otherwise indicated in the proposal request, within seven (7) days of receipt of the proposal request, submit to the Architect for the Owner's review an itemized estimate of the cost necessary to execute the proposed change.
    - a. Itemize materials and labor separately. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental and amounts of trade discounts and/or mark-ups.
    - c. Include a statement indicating the effect the proposed change in the Work will have on the Contract Time; including a detailed schedule of time necessary to procure and perform the work and which activities on the schedule are affected.
  - 3. The proposal (quotation) if accepted will be binding on the Contractor and shall be the only compensation to the Contractor for the change. A Contractor's delay in submitting the proposal by the Contractor will not entitle the Contractor to an extension of time or damages for delay.
- B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions require modifications to the contract, the Contractor may propose changes by submitting a request for a change to the Architect within seven (7) days of the occurrence of the event or item of latent or unforeseen work giving rise to the assumed change.
  - 1. Include a statement outlining the reasons for the change and the affect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time. Including a detailed schedule of time necessary to proceed and perform the work and which actions on the schedule are effected.
  - 2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey date to substantiate quantities.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade



discounts.

- D. The proposal (quotation) if accepted will be binding on the Contractor and shall be the only compensation to the Contractor for the change. A delay in submitting the proposal by the Contractor will not entitle the Contractor to an extension of time or damages for delay. The Architect will have fourteen (14) days to review the proposal during which time he may request additional information to backup the claim. No delay to the project will be considered until at least twenty-one (21) days after the proposal is submitted and will then only be considered if the net effect on the schedule can be clearly shown.

#### 1.4 Construction Change Directive

- A. Construction Change Directive: When the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal Request, the Architect may issue a Construction Change Directive on AIA Form G-714, instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in Owner Change Order form in Section 1.
  - 1. The Construction Change Directive will contain a complete description of the change in the Work and designate the method to be followed to determine change in the Contract Sum or Contract Time.
  - 2. The Contractor will be required to submit unit costs, equipment rates and labor rates as requested by the Architect which shall be agreed upon before the work progresses unless the Contractor is directed to proceed in the absences of an agreement or in an emergency.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive. Provide a copy of those records by daily fax or weekly mail to the Owner and the architect.
  - 1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

#### 1.5 Change Order Procedures

- A. Upon the Owner's approval of a Change Order Proposal Request, the Architect will issue a Change Order for signatures of the Owner and Contractor on the Owner's Change Order Form in Section 1 or if Owner approved the AIA Form G-701, as provided in the Conditions of the Contract.
- B. A fully executed Change Order is the only legal document which can change the Contract Sum or Time.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

## SECTION 012900 - PAYMENT PROCEDURES

## PART 1 - GENERAL

## 1.1 Related Documents

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

## 1.2 Summary

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
  - 1. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.

## 1.3 Definitions

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

## 1.4 Schedule of Values

- A. Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.
- B. The Contractor shall coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.
  - 1. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
    - a. Contractor's construction schedule.
    - b. Application for Payment form.
    - c. List of subcontractors.
    - d. List of principal suppliers and fabricators.
    - e. Schedule of submittals.
  - 2. Submit the Schedule of Values to the Architect at the earliest possible date, but no later than seven days prior to the first Application for Payment. The schedule of values must be received and approved before the first pay application will be processed.
- C. Format and Content: Format and Content: Use the Specifications Table of Contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification section, and provide two line items where separate labor and materials are required. Provision of quantity information requested on the schedule of values in no way alters the Contractors responsibility to provide all material and labor necessary to complete the project.
  - 1. Identification: Include the following Project identification on the Schedule of Values:
    - a. Project name and location.
    - b. Name of the Architect.

- d. Contractor's name and address.
- e. Date of submittal.
2. Arrange the Schedule of Values in a tabular form utilizing AIA Document G-703 continuation sheets of the Application for Payment and indicate the following:
  - a. General name of Product/Work.
  - b. Related Specification Section.
  - c. Name of subcontractor.
  - d. Name of manufacturer, fabricator or supplier.
  - f. Separate Dollar values for Material and Labor.
  - g. Percentage of Contract Sum to the nearest percent, adjusted to total 100 percent.
3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principle subcontract amounts down into several line items.
4. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.
5. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent anticipated stage of completion, and for total installed value of that part of the Work.
6. At the Contractors option, temporary facilities and other cost items that are not part of the direct cost of actual work in place may be shown as separate line items in the schedule of values or distributed as general overhead expense.

#### 1.5 Applications for Payment:

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner
  1. The initial Application for Payment, the Application for Payment at time of Substantial Completion and the final Application for Payment involve additional requirements.
- B. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use Owner's Application for Payment Form in Section 1 for Application for Payment.
- D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Contractor. Incomplete applications will be returned without action.
  1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
  2. Include amounts of Change Orders issued prior to the last day of the construction period covered by the application.
- F. Transmittal: Submit four (4) signed and notarized original forms of each Application for Payment to the Architect at the monthly meeting.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of the first Application for Payment include the following:
  1. List of subcontractors.

2. List of principal suppliers and fabricators.
  3. Schedule of Values.
  4. Contractor's Construction Schedule.
  5. Submittal Schedule.
  6. List of Contractor's staff assignments.
  7. Copies of building permits.
- H. Monthly Applications for payment should be accompanied by the following documents
1. Sales and Use Tax form
  2. Surety Statement
  3. Updated Project Progress Schedule
- I. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work. Administrative actions and submittals that shall proceed or coincide with this application include:
1. Occupancy permits and similar approvals.
  2. Warranties (guarantees) and maintenance agreements.
  3. Test/adjust/balance records.
  4. Maintenance instructions.
  5. Meter readings.
  6. Change-over information related to Owner's occupancy, use, operation and maintenance.
  7. Final cleaning.
  8. Application for reduction of retainage and consent of surety.
  9. Advise on shifting insurance coverages.
  10. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.
  11. Architects Certificate of Compliance required by NCGS #133-1.1
  12. Change of door locks to owner's access and furnish keys to owner's representative.
- J. Final Payment Application: Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:
1. Completion of Project close-out requirements.
  2. Completion of items specified for completion after Substantial Completion.
  3. Affidavit of Prime Contractor (AIA Document G-706).
  4. Affidavit of Release and Waiver of Claims (AIA Document G-706-A).
  5. Consent of Surety to Final Payment.
  6. Transmittal of required Project construction records to Owner.
  7. Certified as-built survey.
  8. Proof that taxes, fees and similar obligations have been paid.
  9. Removal of temporary facilities and services.
  10. Removal of surplus materials, rubbish and similar elements.
  11. As-built drawings.
  13. All warranties properly executed.
  14. Documentation that all utility turnovers have been made.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION

## SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Requests for Information (RFIs).
  - 3. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
  - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 2. Section 017300 "Execution" for procedures for coordinating general installation and field- engineering services, including establishment of benchmarks and control points.
  - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

## 1.3 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Per terms of the IFB, 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.
- B. Key Personnel Names: Per terms of the IFB, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify

individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, on Contract Control Software web site, and by each temporary telephone. Keep list current at all times.

#### 1.5 KEY PERSONNEL

- A. General: In addition to Project Manager and Project Superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
- B. Project Manager: Engage a qualified project manager for the duration of the construction work. Qualifications include the following:
  1. 5 years or more experience in managing work of the type required for this Project.
  2. Submit complete resume of proposed individual to the Owner and Owner's Representatives.
- C. Project Manager Responsibilities: Project Manager shall represent the Contractor, and communications given to the Project Manager shall be as binding as if given to the Contractor. Responsibilities include, but are not limited to, the following:
  1. Project Manager shall be responsible for the day-to-day management of the Project and ensure the Project is constructed to the specified quality requirements and complies with the project schedule and budget.
  2. Organize, oversee and coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
    - a. Obtaining permits not provided by the Owner (e.g., public right-of-way and trade permits)
    - b. Preparation and updating of Contractor's Construction Schedule.
    - c. Preparation of the Schedule of Values.
    - d. Installation and removal of temporary facilities and controls.
    - e. Delivery and processing of submittals.
    - f. Procurement of materials.
    - g. Generation and processing of RFIs.
    - h. Generation and processing of Proposed Change Orders and Change Orders.
    - i. Generation and processing of Application of Payments.
    - j. Progress meetings.
    - k. Preinstallation conferences.
    - l. Startup and adjustment of systems.
    - m. Project closeout activities.
  3. Monitor and assist in coordinating the schedules of the Contractor, the

- Subcontractors and materials and equipment suppliers.
  - 4. Conduct conferences and maintain communications with subcontractors, suppliers, and other concerned parties as necessary to maintain coordination and schedules, and resolve matters in dispute.
  - 5. Attend and participate in Project Progress Meetings and Preinstallation Meetings.
  - 6. Review submittals for compliance with Contract Documents and stamp each submittal certifying the following prior to submission to Owner's Representatives:
    - a. Approval of materials, fit and coordination.
    - b. Field dimensions and clearance dimensions.
    - c. Relation to available space.
    - d. Effect of changes on the work of other trades, if any.
    - e. Compatibility with equipment and work of other trades.
  - 7. Organize and oversee compilation and assembly of project record information.
- D. Project Superintendent: Engage a full-time, on-site, qualified project superintendent for the duration of the construction work. Qualifications include the following:
- 1. Experienced in field work of the type required for this Project.
  - 2. Submit name and address and complete resume to Owner's Representative.
- E. Superintendent Responsibilities: Superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Responsibilities include, but are not limited to, the following:
- 1. Assist in coordinating scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
    - a. Preparation of Contractor's Construction Schedule.
    - b. Preparation of the Schedule of Values.
    - c. Installation and removal of temporary facilities and controls.
    - d. Delivery and processing of submittals.
    - e. Progress meetings.
    - f. Preinstallation conferences.
    - g. Project closeout activities.
    - h. Startup and adjustment of systems.
    - i. Project closeout activities.
  - 2. Coordinate the schedules of the Contractor, the Subcontractors and materials and equipment suppliers.
  - 3. Verify timely deliveries of products for installation by the trades.
  - 4. Verify that labor and materials are adequate to maintain schedules.
  - 5. Conduct conferences and maintain communications with subcontractors, suppliers, and other concerned parties as necessary to maintain coordination and schedules, and resolve matters in dispute.
  - 6. Participate in project meetings including preinstallation meetings.



7. Report progress of work. Submit daily report to Owner's Representative listing number and type of work force and work in progress, significant events of the day, weather conditions, and other work conditions. These reports shall be complete and unedited as produced by the superintendent and shall be submitted to the Architect and Owner on a weekly basis.
8. Recommend needed changes in schedules.
9. Assist in compiling and assembling project record information.
10. Observe required testing. Maintain a record of tests including the following:
  - a. Testing agency and name of inspector.
  - b. Subcontractor.
  - c. Manufacturer's representative present.
  - d. Date and time of testing.
  - e. Type of product or equipment.
  - f. Type of test, and results.
  - g. Retesting required.
11. Verify that subcontractors maintain accurate record documents.
12. Coordinate and schedule the Work and associated inspections with utility providers and authorities having jurisdiction.
13. Oversee project safety and administer the Contractor's Project Safety Plan.
14. Supervise overall installation and material quality control.

#### 1.6 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
  1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
  4. Make alterations as may be necessary to make adjustable parts fit to fixed parts, leaving all complete and in proper working condition when done. All dimensions given on the drawings shall be verified as related to this work before work is started.
  5. Do not scale the Drawings for roughing-in measurements or use Contract Drawings as shop drawings. Where drawings are required for these purposes or where drawings must be made from field measurements, the Contractor shall take the necessary measurements and prepare the drawings.
  6. Coordinate shop drawings of subcontractors to eliminate interferences and to provide sufficient space for installation of components.
  7. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

#### 1.7 REQUESTS FOR INFORMATION (RFIs)

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

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Identification of related Minor Change in the Work, Work Order, Change Order, Proposed Change Order, or Proposed Modification, as appropriate.
11. Field dimensions and conditions, as appropriate.
12. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
13. Contractor's signature.
14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
  - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

- C. RFI Forms: Contract Control Software-generated form with substantially the same content as indicated above.
    - 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
  - D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
    - 1. The following Contractor-generated RFIs will be returned without action:
      - a. Requests for approval of submittals.
      - b. Requests for approval of substitutions.
      - c. Requests for approval of Contractor's means and methods.
      - d. Requests for coordination information already indicated in the Contract Documents.
      - e. Requests for adjustments in the Contract Time or the Contract Sum.
      - f. Requests for interpretation of Architect's actions on submittals.
      - g. Incomplete RFIs or inaccurately prepared RFIs.
    - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
    - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
      - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Construction Manager in writing within 10 days of receipt of the RFI response.
  - E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Provide software log with not less than the following:
    - 1. Project name.
    - 2. Name and address of Contractor.
    - 3. Name and address of Architect.
    - 4. RFI number including RFIs that were returned without action or withdrawn.
    - 5. RFI description.
    - 6. Date the RFI was submitted.
    - 7. Date Architect's response was received.
  - F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
- 1.8 PROJECT MEETINGS
- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise

indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  3. Minutes: Contractor responsible for recording significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within three days of the meeting.
- B. Preconstruction Conference: Owner or Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Conduct the conference to review responsibilities and personnel assignments.
  2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing and long-lead items.
    - d. Designation of key personnel and their duties.
    - e. Lines of communications.
    - f. Procedures for processing field decisions and Change Orders.
    - g. Procedures for RFIs.
    - h. Procedures for testing and inspecting.
    - i. Procedures for processing Applications for Payment.
    - j. Distribution of the Contract Documents.
    - k. Submittal procedures.
    - l. Preparation of record documents.
    - m. Use of the premises.
    - n. Work restrictions.
    - o. Working hours.
    - p. Owner's occupancy requirements.
    - q. Responsibility for temporary facilities and controls.
    - r. Procedures for moisture and mold control.
    - s. Procedures for disruptions and shutdowns.
    - t. Construction waste management and recycling.
    - u. Parking availability.
    - v. Office, work, and storage areas.
    - w. Equipment deliveries and priorities.
    - x. First aid.
    - y. Security.
    - z. Progress cleaning.
  4. Minutes: Contractor responsible for recording and distributing meeting minutes.

Contractor will present the meeting minutes to Architect for review prior to distribution.

- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Review of mockups.
    - i. Possible conflicts.
    - j. Compatibility requirements.
    - k. Time schedules.
    - l. Weather limitations.
    - m. Manufacturer's written instructions.
    - n. Warranty requirements.
    - o. Compatibility of materials.
    - p. Acceptability of substrates.
    - q. Temporary facilities and controls.
    - r. Space and access limitations.
    - s. Regulations of authorities having jurisdiction.
    - t. Testing and inspecting requirements.
    - u. Installation procedures.
    - v. Coordination with other work.
    - w. Required performance results.
    - x. Protection of adjacent work.
    - y. Protection of construction and personnel.
  3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Architect will schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to

the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of record documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Submittal of written warranties.
    - d. Requirements for preparing operations and maintenance data.
    - e. Requirements for delivery of material samples, attic stock, and spare parts.
    - f. Requirements for demonstration and training.
    - g. Preparation of Contractor's punch list.
    - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - i. Submittal procedures.
    - j. Coordination of separate contracts.
    - k. Owner's partial occupancy requirements.
    - l. Installation of Owner's furniture, fixtures, and equipment.
    - m. Responsibility for removing temporary facilities and controls.
  4. Minutes: Contractor will record and distribute meeting minutes. Contractor will present the meeting minutes to Architect for review prior to distribution.
- E. Progress Meetings: Conduct progress meetings at biweekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
  2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

- 1) Review schedule for next period.
- b. Review present and future needs of each entity present, including the following:
  - 1) Interface requirements.
  - 2) Sequence of operations.
  - 3) Resolution of component conflicts.
  - 4) Status of submittals.
  - 5) Deliveries.
  - 6) Off-site fabrication.
  - 7) Access.
  - 8) Site utilization.
  - 9) Temporary facilities and controls.
  - 10) Progress cleaning.
  - 11) Quality and work standards.
  - 12) Status of correction of deficient items.
  - 13) Field observations.
  - 14) Status of RFIs.
  - 15) Status of proposal requests.
  - 16) Pending changes.
  - 17) Status of Change Orders.
  - 18) Pending claims and disputes.
  - 19) Documentation of information for payment requests.
4. Minutes: Contractor will record and distribute the meeting minutes to each party present and to parties requiring information. Contractor will present the meeting minutes to Architect for review prior to distribution.
  - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

## SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Contractor's construction schedule.
  - 2. Construction schedule updating reports.
  - 3. Site condition reports.
  - 4. Special reports.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
  - 2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. PDF electronic file.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- C. Construction Schedule Updating Reports: Submit with Applications for Payment.
- D. Site Condition Reports: Submit at time of discovery of differing conditions.
- E. Special Reports: Submit at time of unusual event.

## 1.4 COORDINATION

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



schedule them in proper sequence.

## PART 2 - PRODUCTS

### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
  2. Procurement Activities: Include procurement process activities for the long lead items and major items, requiring a cycle of more than 20 days as identified by the Contractor, as separate activities in schedule.
  3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Construction Manager's administrative procedures necessary for certification of Substantial Completion.
  6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
  2. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Partial occupancy before Substantial Completion.
    - b. Use of premises restrictions.
    - c. Seasonal variations.
    - d. Environmental control.
    - e. Uninterruptible services.
  3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.

- c. Purchases.
  - d. Mockups.
  - e. Fabrication.
  - f. Sample testing.
  - g. Deliveries.
  - h. Installation.
  - i. Tests and inspections.
  - j. Adjusting.
  - k. Curing.
  - l. Startup and placement into final use and operation.
  - m. Contractor's list of incomplete work.
  - n. Commissioning of systems.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
1. Selective demolition completion.
  2. Drywall and painting completion.
  3. Setting of base cabinets and templating of lab countertops.
  4. Completion of cabinet and countertop work.
  5. Completion of mechanical installation.
  6. Completion of electrical installation.
  7. Substantial Completion.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
  2. Unanswered Requests for Information.
  3. Rejected or unreturned submittals.
  4. Notations on returned submittals.
  5. Pending modifications affecting the Work and Contract Time.
- F. Recovery Schedule: When periodic update indicates the Work is 5 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

## 2.2 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Detailed Construction Schedule within time frame indicated in Section 013202 "Owner Determined Milestones."
1. Base schedule on the preliminary construction schedule and additional information received since the start of Project.

- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.
- C. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall Project schedule.
- D. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
  - 1. Contractor or subcontractor and the Work or activity.
  - 2. Description of activity.
  - 3. Main events of activity.
  - 4. Immediate preceding and succeeding activities.
  - 5. Early and late start dates.
  - 6. Early and late finish dates.
  - 7. Activity duration in workdays.
  - 8. Average size of workforce.
- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
  - 1. Identification of activities that have changed.
  - 2. Changes in early and late start dates.
  - 3. Changes in early and late finish dates.
  - 4. Changes in activity durations in workdays.
  - 5. Changes in the Contract Time.

### 2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  - 1. List of subcontractors at Project site.
  - 2. List of separate contractors at Project site.
  - 3. Approximate count of personnel at Project site.
  - 4. Equipment at Project site.
  - 5. Material deliveries.
  - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
  - 7. Accidents.
  - 8. Meetings and significant decisions.
  - 9. Unusual events (see special reports).
  - 10. Stoppages, delays, shortages, and losses.

11. Meter readings and similar recordings.
  12. Emergency procedures.
  13. Orders and requests of authorities having jurisdiction.
  14. Change Orders received and implemented.
  15. Work Orders received and implemented.
  16. Services connected and disconnected.
  17. Equipment or system tests and startups.
  18. Partial completions and occupancies.
  19. Substantial Completions authorized.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

#### 2.4 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner's Representatives within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner's Representatives in advance when these events are known or predictable.

### PART 3 - EXECUTION

#### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

## SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Preconstruction photographs.
  - 2. Periodic construction photographs.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
  - 1. Digital Camera: Minimum sensor resolution of 12 megapixels.
  - 2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
  - 3. Identification: Provide the following information with each image description in file metadata tag:
    - a. Name of Project.
    - b. Name of Contractor.
    - c. Date photograph was taken.
    - d. Unique sequential identifier keyed to accompanying key plan.

## PART 2 - PRODUCTS

## 2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

## PART 3 - EXECUTION

## 3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in

focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
1. Date and Time: Include date and time in file name for each image.
  2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect and Construction Manager.
- C. Preconstruction Photographs: Before commencement of demolition, take photographs of Project site, including existing items to remain during construction, from different vantage points, as directed by Architect.
1. Take 20 photographs of existing building interior adjacent to the worksite and staging areas to accurately record physical conditions at start of construction.
- D. Periodic Construction Photographs: Take 20 photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

END OF SECTION

## SECTION 013300 - SUBMITTAL PROCEDURES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
  - 1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
  - 2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
  - 3. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 5. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

## 1.3 DEFINITIONS

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

## 1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
  - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include



submittals required during the first 60 days of construction. List those submittals required to maintain orderly

progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
  - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
  - a. Scheduled date for first submittal.
  - b. Specification Section number and title.
  - c. Submittal category: Action; informational.
  - d. Name of subcontractor.
  - e. Description of the Work covered.
  - f. Scheduled date for Architect's final release or approval.

#### 1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. 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. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  1. Initial Review: Allow 14 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow **10** days for review of each resubmittal.
  4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect, Architect's consultants And/or Owner, allow 14 days for review of each submittal. Submittal will be returned through Architect, before being returned to Contractor.
- C. Electronic Submittals: Identify and incorporate information in each electronic submittal

file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  2. Name file with submittal number or other unique identifier, including revision identifier.
    - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
  3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
  4. Transmittal Form for Electronic Submittals: Contractor's option, containing the following information:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.
    - d. Name of Contractor.
    - e. Name of firm or entity that prepared submittal.
    - f. Names of subcontractor, manufacturer, and supplier.
    - g. Category and type of submittal.
    - h. Submittal purpose and description.
    - i. Specification Section number and title.
    - j. Drawing number and detail references, as appropriate.
    - k. Location(s) where product is to be installed, as appropriate.
    - l. Related physical samples submitted directly.
    - m. Indication of full or partial submittal.
    - n. Transmittal number.
    - o. Remarks.
  5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
    - a. Project name.
    - b. Number and title of appropriate Specification Section.
    - c. Manufacturer name.
    - d. Product name.
- D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
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 Architect's action stamp.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## PART 2 - PRODUCTS

## 2.1 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 PDF electronic files.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- 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. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams 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 before or concurrent with Samples.
  6. Submit Product Data in the following format:
    - a. PDF electronic file.
- 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, unless submittal based on Architect's digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

- a. Identification of products.
  - b. Schedules.
  - c. Compliance with specified standards.
  - d. Notation of coordination requirements.
  - e. Notation of dimensions established by field measurement.
  - f. Relationship and attachment to adjoining construction clearly indicated.
  - g. Seal and signature of professional engineer if specified.
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 the following format:
    - a. PDF electronic file.
- 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. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
  3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
  4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
  6. 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. Architect will retain two Sample sets; remainder will be returned.
  - 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. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
  5. Submit product schedule in the following format:
    - a. PDF electronic file.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- L. 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.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. 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.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- U. 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.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## 2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents,

provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

### PART 3 - EXECUTION

#### 3.1 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 Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. 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 Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

#### 3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
  1. "No Exception Taken".
  2. "Make Corrections Noted".
  3. "Amend and Resubmit".
  4. "Rejected – See Remarks".
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- D. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION

## SECTION 014000 - QUALITY REQUIREMENTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

- 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
- 2. Specified tests, inspections, and related actions do not limit Contractor's other quality- assurance and -control procedures that facilitate compliance with the Contract Document requirements.
- 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.

## 1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).



- D. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

#### 1.4 CONFLICTING REQUIREMENTS

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

#### 1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
  - 1. Indicate manufacturer and model number of individual components.
  - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
  - 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
  - 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

#### 1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.

6. Description of the Work and test and inspection method.
  7. Identification of product and Specification Section.
  8. Complete test or inspection data.
  9. Test and inspection results and an interpretation of test results.
  10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and reinspecting.
- B. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.8 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
1. Manufacturer-Approved Installer: Installer's qualifications to install products according to manufacturer's written instructions, including experience and training, have been reviewed and accepted by the manufacturer.
  2. Manufacturer Certified Installer: Manufacturer-approved Installer and Installer's field personnel meet the requirements of the manufacturer's established training and certification program.
  3. Manufacturer's willingness to sell product to Contractor or Installer engaged by Contractor does not in itself confer qualification on the buyer.
- E. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

- F. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- G. **Preconstruction Testing:** Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. **Contractor responsibilities include the following:**
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
    - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
    - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - f. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
  - 2. **Testing Agency Responsibilities:** Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, through Construction Manager, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

## 1.9 QUALITY CONTROL

- A. **Owner Responsibilities:** Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  - 1. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be reduced by Change Order in the amount of the corresponding costs.
- B. **Contractor Responsibilities:** Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
  - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  - 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

- a. Contractor shall not employ same entity engaged by Owner or Construction Manager, unless agreed to in writing by Owner.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Construction Manager.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 TEST AND INSPECTION LOG

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

### 3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
- B. Protect construction exposed by or for quality-control service activities.
- C. Protect mockup from exposure to weather.

- D. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

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## SECTION 014200 - REFERENCES

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

## 1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.



- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

#### 1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
  - 1. IAPMO - International Association of Plumbing and Mechanical Officials; [www.iapmo.org](http://www.iapmo.org).
  - 2. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
  - 3. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 014533 - CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Code-required special inspections.
- B. Testing services incidental to special inspections.
- C. Submittals.

1.2 RELATED REQUIREMENTS

- A. Section 014000 - Quality Requirements.

1.3 ABBREVIATIONS AND ACRONYMS

- A. AHJ: Authority having jurisdiction.
- B. IAS: International Accreditation Service, Inc.
- C. NIST: National Institute of Standards and Technology.

1.4 DEFINITIONS

- A. Code or Building Code: ICC (IBC)-2018, Edition of the International Building Code and specifically, Chapter 17 - Special Inspections and Tests.
- B. Authority Having Jurisdiction (AHJ): Agency or individual officially empowered to enforce the building, fire and life safety code requirements of the permitting jurisdiction in which the Project is located.
- C. Special Inspection:
  - 1. Special inspections are inspections and testing of materials, installation, fabrication, erection or placement of components and connections mandated by the AHJ that also require special expertise to ensure compliance with the approved Contract Documents and the referenced standards.
  - 2. Special inspections are separate from and independent of tests and inspections conducted by Owner for the purposes of quality assurance and contract administration.

## 1.5 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary 2019 (Reapproved 2022).
- B. AISC 360 - Specification for Structural Steel Buildings 2022.
- 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 C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field 2022.
- E. ASTM C172/C172M - Standard Practice for Sampling Freshly Mixed Concrete 2017.
- F. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction 2019.
- G. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2021.
- H. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing 2021.
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- J. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel 2018, with Errata (2022).
- K. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars 2018, with Amendment (2020).
- L. IAS AC89 - Accreditation Criteria for Testing Laboratories 2021.
- M. IAS AC291 - Accreditation Criteria for Special Inspection Agencies AC291 2019.
- N. ICC (IBC)-2018 - International Building Code 2018.
- O. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.

## 1.6 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Special Inspection Agency Qualifications: Prior to the start of work, the Special Inspection Agency is required to:
  - 1. Submit agency name, address, and telephone number, names of full time registered Engineer and responsible officer.
  - 2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

3. Submit certification that Special Inspection Agency is acceptable to AHJ.
  4. Submit documentation that Special Inspection Agency is accredited by IAS according to IAS AC291.
- C. Testing Agency Qualifications: Prior to the start of work, the Testing Agency is required to:
1. Submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
  2. Submit copy of report of laboratory facilities inspection made by NIST Construction Materials Reference Laboratory during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.
  3. Submit certification that Testing Agency is acceptable to AHJ.
  4. Submit documentation that Testing Agency is accredited by IAS according to IAS AC89.
- D. Fabricator's Qualification Statement: Fabricator is required to submit documentation of fabrication facilities and methods as well as quality control procedures.
- E. Special Inspection Reports: After each special inspection, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to the AHJ.
1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of Special Inspector.
    - d. Date and time of special inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of special inspection.
    - h. Date of special inspection.
    - i. Results of special inspection.
    - j. Compliance with Contract Documents.
  2. Final Special Inspection Report: Document special inspections and correction of discrepancies prior to the start of the work.
- F. Fabricator Special Inspection Reports: After each special inspection of fabricated items at the Fabricator's facility, Special Inspector is required to promptly submit at least two copies of report; one to Architect and one to AHJ.

1. Include:
  - a. Date issued.
  - b. Project title and number.
  - c. Name of Special Inspector.
  - d. Date and time of special inspection.
  - e. Identification of fabricated item and specification section.
  - f. Location in the Project.
  - g. Results of special inspection.
  - h. Verification of fabrication and quality control procedures.
  - i. Compliance with Contract Documents.
  - j. Compliance with referenced standard(s).
- G. Test Reports: After each test or inspection, promptly submit at least two copies of report; one to Architect and one to AHJ.
  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 or inspection.
    - h. Date of test or inspection.
    - i. Results of test or inspection.
    - j. Compliance with Contract Documents.
- H. Certificates: When specified in individual special inspection requirements, Special Inspector shall submit certification by the manufacturer, fabricator, and installation subcontractor to Architect and AHJ, 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.

1.7 SPECIAL INSPECTION AGENCY

- A. Owner will employ services of a Special Inspection Agency to perform inspections and associated testing and sampling in accordance with ASTM E329 and required by the building code.
- B. The Special Inspection Agency may employ and pay for services of an independent testing agency to perform testing and sampling associated with special inspections and required by the building code.
- C. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.8 TESTING AND INSPECTION AGENCIES

- A. Owner may employ services of an independent testing agency to perform additional testing and sampling associated with special inspections but not required by the building code.
- B. Employment of agency in no way relieves Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.9 QUALITY ASSURANCE

- A. Special Inspection Agency Qualifications:
  1. Independent firm specializing in performing testing and inspections of the type specified in this section.
- B. Testing Agency Qualifications:
  1. Independent firm specializing in performing testing and inspections of the type specified in this section.
- C. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 SCHEDULE OF SPECIAL INSPECTIONS, GENERAL

- A. Frequency of Special Inspections: Special Inspections are indicated as continuous or periodic.
  1. Continuous Special Inspection: Special Inspection Agency is required to be present in the area where the work is being performed and observe the work at all times the work is in progress.

2. Periodic Special Inspection: Special Inspection Agency is required to be present in the area where work is being performed and observe the work part-time or intermittently and at the completion of the work.

### 3.2 SPECIAL INSPECTIONS FOR STEEL CONSTRUCTION

- A. Structural Steel: Comply with quality assurance inspection requirements of ICC (IBC)-2018.
- B. High-Strength Bolt, Nut and Washer Material:
  1. Verify identification markings comply with ASTM standards specified in the approved contract and to AISC 360, Section A3.3; periodic.
  2. Submit manufacturer's certificates of compliance; periodic.
- C. High-Strength Bolting Installation: Verify items listed below comply with AISC 360, Section M2.5.
  1. Snug tight joints; periodic.
- D. Structural Steel and Cold Formed Steel Deck Material:
  1. Structural Steel: Verify identification markings comply with AISC 360, Section M3.5; periodic.
  2. Other Steel: Verify identification markings comply with ASTM standards specified in the approved Contract Documents; periodic.
  3. Submit manufacturer's certificates of compliance and test reports; periodic.
- E. Weld Filler Material:
  1. Verify identification markings comply with AWS standards specified in the approved Contract Documents and to AISC 360, Section A3.5; periodic.
  2. Submit manufacturer's certificates of compliance; periodic.
- F. Welding:
  1. Structural Steel:
    - a. Complete and Partial Joint Penetration Groove Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
    - b. Multipass Fillet Welds: Verify compliance with AWS D1.1/D1.1M; continuous.
    - c. Single Pass Fillet Welds Less than 5/16 inch Wide: Verify compliance with AWS D1.1/D1.1M; periodic.
    - d. Plug and Slot Welds: Verify compliance with AWS D1.1/D1.1M; continuous.

- e. Single Pass Fillet Welds 5/16 inch or Greater: Verify compliance with AWS D1.1/D1.1M; continuous.
  - f. Floor and Roof Deck Welds: Verify compliance with AWS D1.3/D1.3M; continuous.
2. Reinforcing Steel: Verify items listed below comply with AWS D1.4/D1.4M and ACI CODE-318, Section 3.5.2.
- a. Verification of weldability; periodic.
  - b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames as well as where it is referenced in older codes. Elements of special structural walls of concrete and shear reinforcement; continuous.
  - c. Shear reinforcement; continuous.
  - d. Other reinforcing steel; periodic.

### 3.3 SPECIAL INSPECTIONS FOR CONCRETE CONSTRUCTION

- A. Reinforcement, Including Prestressing Tendons, and Verification of Placement: Verify compliance with ACI CODE-318, Chapters 20, 25.2, 25.3, 26.6.1-26.6.3; periodic.
- B. Reinforcing Steel, Including Prestressing of Tendons and Placement: Verify compliance with approved Contract Documents and ACI CODE-318, Sections 3.5 and 7.1 through 7.7; periodic.
- C. Anchors Cast in Concrete: Verify compliance with ACI CODE-318; periodic.
- D. Bolts Installed in Concrete: Where allowable loads have been increased or where strength design is used, verify compliance with approved Contract Documents and ACI CODE-318, Sections 8.1.3 and 21.2.8 prior to and during placement of concrete; continuous.
- E. Anchors Post-Installed in Hardened Concrete: Verify compliance with ACI CODE-318.
  - 1. Adhesive Anchors: Verify horizontally or upwardly-inclined orientation installations resisting sustained tension loads - Section 17.8.2.4; continuous.
  - 2. Other Mechanical and Adhesive Anchors: Verify as per Chapter 17.8.2; periodic.
- F. Design Mix: Verify plastic concrete complies with the design mix in approved Contract Documents and with ACI CODE-318, Chapter 19, 16.4.3, 26.4.4; periodic.
- G. Concrete Sampling Concurrent with Strength Test Sampling: Each time fresh concrete is sampled for strength tests, verify compliance with ASTM C172/C172M, ASTM C31/C31M, and ACI CODE-318, Sections 5.6 and 5.8 and record the following, continuous:
  - 1. Slump.
  - 2. Air content.
  - 3. Temperature of concrete.



- H. Specified Curing Temperature and Techniques: Verify compliance with approved Contract Documents and ACI CODE-318, Sections 5.11 through 5.13; periodic.
- I. Formwork Shape, Location and Dimensions: Verify compliance with approved Contract Documents and ACI CODE-318, Section 6.1.1; periodic.
- J. Materials: If the Contractor cannot provide sufficient data or documentary evidence that concrete materials comply with the quality standards of ACI CODE-318, the AHJ will require that the Special Inspector verify compliance with the appropriate standards and criteria in , Chapter 3.

### 3.4 SPECIAL INSPECTIONS FOR MASONRY CONSTRUCTION

- A. Masonry Structures Subject to Special Inspection:
  - 1. Masonry construction when required by the quality assurance program of TMS 402/602.
  - 2. Empirically designed masonry, glass unit masonry and masonry veneer in structures designated as "essential facilities".
    - a. Perform inspections in accordance with Level B Quality Assurance.
  - 3. Engineered masonry in structures classified as "low hazard..." and "substantial hazard to human life in the event of failure".
- B. Verify each item below complies with approved Contract Documents and the applicable articles of TMS 402/602.
  - 1. Inspections and Approvals:
    - a. Verify compliance with the required inspection provisions of the approved Contract Documents; periodic.
    - b. Verify approval of submittals required by Contract Documents; periodic.
  - 2. Compressive Strength of Masonry: Verify compressive strength of masonry units prior to start of construction unless specifically exempted by code; periodic.
  - 3. Slump Flow and Visual Stability Index (VSI): Verify compliance as self consolidating grout arrives on site; continuous.
  - 4. Joints and Accessories: When masonry construction begins, verify:
    - a. Proportions of site prepared mortar; periodic.
    - b. Construction of mortar joints; periodic.
    - c. Location of reinforcement, connectors, prestressing tendons, anchorages, etc; periodic.
  - 5. Structural Elements, Joints, Anchors, Protection: During masonry construction, verify:
    - a. Size and location of structural elements; periodic.

- b. Type, size and location of anchors, including anchorage of masonry to structural members, frames or other construction; periodic.
  - c. Size, grade and type of reinforcement, anchor bolts and prestressing tendons and anchorages; periodic.
  - d. Welding of reinforcing bars; continuous.
6. Grouting Preparation: Prior to grouting, verify:
- a. Grout space is clean; periodic.
  - b. Correct placement of reinforcing, connectors, prestressing tendons and anchorages; periodic.
  - c. Correctly proportioned site prepared grouts and prestressing grout for bonded tendons; periodic.
  - d. Correctly constructed mortar joints; periodic.
7. Preparation of Grout Specimens, Mortar Specimens and Prisms: Observe preparation of specimens; periodic.

### 3.5 SPECIAL INSPECTIONS FOR SOILS

- A. Materials and Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
1. Design bearing capacity of material below shallow foundations; periodic.
  2. Design depth of excavations and suitability of material at bottom of excavations; periodic.
  3. Materials, densities, lift thicknesses; placement and compaction of backfill: continuous.
  4. Subgrade, prior to placement of compacted fill verify proper preparation; periodic.
- B. Testing: Classify and test excavated material; periodic.

### 3.6 SPECIAL INSPECTIONS FOR DRIVEN DEEP FOUNDATIONS

- A. Materials, Equipment and Final Placement: Verify each item below complies with approved construction documents and approved geotechnical report.
1. Material types, sizes and lengths; continuous.
  2. Capacities of test elements and additional load tests as required; continuous.
  3. Placement locations and plumbness; continuous.
  4. Type and size of hammer; continuous.

- B. Installation: Observe driving operations and maintain complete and accurate records for each element; continuous.
  - 1. Record number of blows per foot of penetration.
  - 2. Determine penetration required to achieve design capacity.
  - 3. Record tip and butt elevations.
  - 4. Document any damage to foundation element.

### 3.7 SPECIAL INSPECTION OFR MODULAR RETANING WALLS

- A. Requirements for special inspection for modular retaining walls as defined by the contract drawings

### 3.8 SPECIAL INSPECTION AGENCY DUTIES AND RESPONSIBILITIES

- A. Special Inspection Agency shall:

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

- B. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

- C. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

### 3.9 TESTING AGENCY DUTIES AND RESPONSIBILITIES

- A. Testing Agency Duties:

- 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
- 2. Perform specified sampling and testing of products in accordance with specified standards.

3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of work or products.
5. Perform additional tests and inspections required by Architect.
6. Submit reports of all tests or inspections specified.

B. Limits on Testing or Inspection Agency Authority:

1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Agency may not approve or accept any portion of the work.
3. Agency may not assume any duties of Contractor.
4. Agency has no authority to stop the work.

C. On instructions by Architect, perform re-testing required because of non-compliance with specified requirements, using the same agency.

D. Contractor will pay for re-testing required because of non-compliance with specified requirements.

### 3.10 CONTRACTOR DUTIES AND RESPONSIBILITIES

A. Contractor Responsibilities, General:

1. Deliver to agency at designated location, adequate samples of materials for special inspections that require material verification.
2. Cooperate with agency and laboratory personnel; provide access to approved documents at project site, to the work, to manufacturers' facilities, and to fabricators' facilities.
3. Provide incidental labor and facilities:
  - a. To provide access to work to be tested or inspected.
  - b. To obtain and handle samples at the site or at source of Products to be tested or inspected.
  - c. To facilitate tests or 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 or inspection services.

5. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

END OF SECTION

## SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Supplementary Conditions and Special Conditions for work restrictions and limitations on utility interruptions.

## 1.3 USE CHARGES

- A. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- B. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, staging areas, and parking areas for construction personnel.
- B. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
  - 1. Locations of dust-control partitions at each phase of work.
  - 2. HVAC system isolation schematic drawing.
  - 3. Location of proposed air-filtration system discharge.
  - 4. Waste handling procedures.
  - 5. Other dust-control measures.

## 1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

## 1.6 PROJECT CONDITIONS

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame- spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- B. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.

### 2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
  - 1. Store combustible materials apart from building.

### 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
  - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent

facilities.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Connect to existing service.
- B. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- C. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- D. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  - 1. Maintain dust partitions during the Work. Use vacuum collection attachments on dust- producing equipment. Isolate limited work within occupied areas using portable dust- containment devices.
  - 2. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
  - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- F. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  - 1. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.



- a. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.
- B. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
- C. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
  1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
  1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- D. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
  1. Prohibit smoking in construction areas.
  2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### 3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

- B. Maintenance: Maintain facilities in good operating condition until removal.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

END OF SECTION

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## SECTION 016000 - PRODUCT REQUIREMENTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 012300 "Additive Bid Items" for products selected under an alternate.
  - 2. Section 012500 "Substitution Procedures" for requests for substitutions.

## 1.3 DEFINITIONS

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

## 1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
  2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
    - a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
    - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

#### 1.5 QUALITY ASSURANCE

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

#### 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.
  2. Store materials in a manner that will not endanger Project structure.
  3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

## 1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Warranty Terms and Conditions: When warranty offered by manufacturer does not fulfill specified requirements, provide Contractor warranty in form acceptable to Owner to supplement manufacturer's warranty at no additional cost to the Owner.
- D. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor convenience will not be considered.
3. Products:
  - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
  - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements.  
Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, and will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  5. Samples, if requested.

## PART 3 - EXECUTION (Not Used)

END OF SECTION



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## SECTION 017300 - EXECUTION

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

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

## 1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
  - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
  - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
    - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

## 1.5 QUALITY ASSURANCE

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning the Work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  - 1. Description of the Work.
  - 2. List of detrimental conditions, including substrates.
  - 3. List of unacceptable installation tolerances.
  - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are

discovered, notify Architect promptly.

### 3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  - 2. Allow for building movement, including thermal expansion and contraction.
  - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.5 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 5. Proceed with patching after construction operations requiring cutting are complete.

- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.6 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

### 3.7 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION



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## SECTION 017329 - CUTTING AND PATCHING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section specifies administrative and supervisory requirements for cutting and patching.
- B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
  - 1. Requirements of this section also apply to mechanical and electrical installations. Refer to Division-22 through 33 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.
- C. Each Contractor shall do all cutting, fitting or patching of his work that may be required to insure various parts fit together properly and are prepared to receive or be received by work of other Contractors as indicated or reasonably implied by the drawings and specifications for the completed structure. The Contractor will make corrections as the Architect may direct.
- D. Any cost brought about by defective or ill-timed work shall be borne by the party responsible thereof.
- E. The Contractor shall not endanger any existing or newly completed work by cutting, digging or other activity and shall not cut or alter the work of any other Contractor except with the consent of the Architect.
- F. Cutting and patching should be performed by workers skilled in the trade and sequenced to avoid delays.
- G. The Contractor shall not perform cutting or patching operations that impact the structural, functional, or aesthetic qualities of the work.

## 1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

## 1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, the Contractor shall submit a proposal describing procedures well in advance of the time the cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:
  - 1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.
  - 2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.

3. List products to be used and firms or entities that will perform Work.
4. Indicate dates when cutting and patching is to be performed.
5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.
6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.
7. Approval by the Architect to proceed with cutting and patching does not waive the Architect's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

#### 1.5 QUALITY ASSURANCE

- A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
  1. Obtain written approval of the Architect and Structural Engineer for the cutting and patching proposed before cutting and patching the following structural elements:
    - a. Foundation construction.
    - b. Bearing and retaining walls.
    - c. Structural concrete.
    - d. Structural steel.
    - e. Lintels.
    - f. Timber and primary wood framing.
    - g. Structural decking.
    - h. Stair systems.
    - i. Miscellaneous structural metals.
    - j. Exterior curtain wall construction.
    - k. Equipment supports.
    - l. Piping, ductwork, vessels and equipment.
- B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
- C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's professional judgment, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Retain the original installer or fabricator if possible to cut and patch the categories of exposed Work. Remove and replace any Work that is cut and patched in a visually unsatisfactory manner.
- D. Coordination: Each Contractor is responsible for coordinating their operation with that of the other Contractors to minimize the amount of cutting and patching.

#### 1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch and repair materials and surfaces cut or damaged during cutting and patching operation, by methods and with materials so as not to void existing warranties.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Use materials that are identical to existing materials and that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

### 3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction or finishes during cutting and patching operations to prevent damage. Provide protection from adverse weather conditions for any portions of the Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

### 3.3 PERFORMANCE

- A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.
  - 1. Cut existing construction to provide for installation of other components or performance of other construction activities and provide the subsequent fitting and patching required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.
  - 1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed areas.
  - 3. Cut through concrete and masonry using appropriate cutting equipment such as a carborundum saw or diamond core drill.
  - 4. Comply with requirements of applicable Sections of Division-31 where cutting and patching requires excavating and backfilling.
  - 5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining

portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

- C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.
  - 1. Inspect and test patched areas to demonstrate integrity of the installation.
  - 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
  - 3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken area containing the patch, after the patched area has received primer and second coat.
  - 4. Patch, repair or re-hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

#### 3.4 CLEANING

- A. Thoroughly clean areas and spaces where cutting and patching is performed where required for construction or used as access. Leave work in an acceptable completed condition.

END OF SECTION

## SECTION 017413 - PROGRESS AND FINAL CLEANING

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for progress cleaning and final cleaning.

## 1.2 ACTION SUBMITTALS

- A. Product Data:
  - 1. Cleaning Products: Indicate compliance with quality assurance requirements.
  - 2. Disinfectants, Metal Polish, Floor Finishes, and Strippers: Indicate compliance with quality assurance requirements.
- B. Product Application Schedule: Schedule of cleaning products indicating application for each type of product.
- C. Equipment Data: Indicate equipment used for final cleaning complies with quality assurance requirements.
- D. Final Cleaning Program: Description of cleaning procedures and product applications for final cleaning for each type of room, surface and material.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Inspection Reports: For pest control final inspection.

## 1.4 QUALITY ASSURANCE

- A. Product Requirements:
  - 1. Cleaning Products: Comply with Green Seal GS-37.
  - 2. Disinfectants, Metal Polish: Comply with Green Seal GS-40.
  - 3. Floor Finishes, and Strippers: Comply with Green Seal GS-40.
- B. Worker Qualifications: Provide cleaning services performed by experienced firm specializing in cleaning of new construction of similar type and scope, employing workers trained by suppliers of products and equipment utilized in progress and final cleaning.
- C. Equipment Certification: Perform final cleaning utilizing vacuum equipment certified under Carpet and Rug Institute Green Label program, equipped with HEPA filters.
- D. Final Cleaning Standard: Clean facility to APPA Appearance Level 1 in APPA Custodial Staffing Guidelines for Educational Facilities.

## 1.5 COORDINATION

- A. Floor Finish Scheduling: Schedule application of multiple coat floor finish application with CMS representative to coordinate work with Owner installation of furniture.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Materials, General: Do not introduce cleaning agents, disinfectants, metal polishes, floor strippers, or other products into the facility that are not listed on approved product application schedule.
- B. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
  - 1. Unless otherwise indicated, use cleaning products that meet Green Seal GS-37, or if GS- 37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.
- C. Disinfectants, Metal Polishes, and Other Products: Use materials and agents recommended by manufacturer or fabricator of the affected surface. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
  - 1. Unless otherwise indicated, use cleaning products that meet Green Seal GS-40, or if GS- 40 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.
- D. Floor Stripper and Sealer Products: Use materials and agents recommended by manufacturer or fabricator of the affected surface. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
  - 1. Use Owner's stipulated products.

## PART 3 - EXECUTION

### 3.1 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 degF.
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

- a. Utilize containers intended for holding waste materials of type to be stored.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

### 3.2 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations. Leave Project clean and ready for occupancy.
- B. Cleaning: Clean each surface or unit to quality level specified. Comply with product manufacturer's and equipment manufacturer's written instructions.
- C. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:



1. Project Site
  - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
  - b. Sweep paved areas broom clean, wash walkways clean. Remove petrochemical spills, stains, and other foreign deposits.
  - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
  - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
  - e. Remove snow and ice to provide safe access to building.
  
2. Building Exterior and Interior
  - a. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
  - b. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
  - c. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
  - d. Remove labels that are not permanent.
  - e. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
  - f. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.

Remove paint from surface to  
provide intended readability.
  
3. Building Interior
  - a. Clean and disinfect plumbing fixtures, vanity tops, and countertops to a sanitary condition, free of stains, including stains resulting from water exposure.
  - b. Move and reset Owner's furniture, fixtures, and equipment as required to complete cleaning Work. Clean furniture, fixtures, and equipment that have become soiled following Owner's installation.

4. Equipment and Systems
  - a. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - b. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
  - c. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - d. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection. Coordinate of ductwork with other closeout procedures.
  - e. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
  
- D. Cleaning Food Preparation Areas
  1. Comply with cleaning and disinfecting requirements of authorities having jurisdiction.
  2. Clean and disinfect food preparation and food storage room surfaces.
  3. Clean food service equipment.
  
- E. Floor Cleaning and Finishing:
  1. Vacuum building surfaces using approved vacuum equipment.
  2. Resilient and Terrazzo Flooring: Sweep, mop, strip, wax, and buff flooring in accordance with floor wax product manufacturer's recommendations.
    - a. Apply wax at 3 micron dry film thickness per coat.
    - b. Rooms: Strip and apply three coats of wax and buff.
    - c. Corridors: Apply first two coats of wax prior to Owner's setting furniture in rooms. Following setting of furniture, apply additional final three coats of wax and buff.
  3. Hard Tile Flooring: Scrub mop. Do not apply wax to hard tile flooring.
  4. Carpet: Vacuum carpet, removing debris and excess nap.
    - a. Vacuum carpet using approved vacuum equipment.
    - b. Clean new carpet using steam extraction method if visible soil or stains remain.
  5. Concrete Floors: Vacuum and mop sealed concrete floors in unoccupied spaces.
  
- F. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

G. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

1. Do not utilize storm drain system for disposal of floor stripping waste water.

END OF SECTION

## SECTION 017830 - WARRANTIES AND BONDS

## PART 1 - GENERAL

## 1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for warranties and bonds required by the Contract Documents including manufacturers standard warranties on products and special warranties.
  - 1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.
  - 2. General close-out requirements are included in Division 1, Section "Closeout Procedures".
  - 3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted are included in the individual Sections of Divisions -2 through -33.
  - 4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
  
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products nor does it relieve suppliers, manufacturers and subcontractors required to countersign special warranties with the Contractor. All warranties are in addition to Seller's implied warranties of merchantability and fitness for a particular purpose which shall not be disclaimed by Seller. In addition to its rights to reject nonconforming goods, the Owner shall be entitled to all rights and remedies provided by the uniform Commercial Code, Chapter 25 of the North Carolina General Statutes, for breach of express warranties and implied warranties of merchantability and fitness for a particular purpose, including but not limited to consequential and incidental damages.

## 1.3 WARRANTY REQUIREMENTS

- A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
  
- B. Replacement of Warranty: When a component of the Work fails three (3) times within the warranty period and the effect of the failure disables or disrupts the performance of the life, safety, HVAC, sanitary or power distribution system, the manufacturer of the systems shall assume maintenance of the component for the balance of the warranty period plus one (1) year. If the component fails again within the now extended warranty period, the manufacturer shall replace the component with a new unit compatible with the system and reinstate a warranty equal to that of the original component.
  
- C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or re-build the Work to an acceptable condition complying with requirements of Contract Document. The Contractor is responsible for the cost of replacing or re-building defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life. Repair damage to other building

materials and finishes damaged by failure of product, material, equipment or system under warranty. Cost of repairs to be borne by the Contractor whose product caused the damage.

- D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights and remedies otherwise available under the law nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights or remedies.
  - 1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification or similar commitment is required on such Work or part of the Work until evidence is presented that entities required to countersign such commitments are willing to do so.
- F. The warranty on all equipment will be extended from start-up to one (1) year past the date of substantial completion of the Project. Extended warranties such as five year compressor warranties shall be extended beyond the period established by the actual start-up date of the equipment (as defined herein) to commence on the date of substantial completion as established by the architect.

#### 1.4 SUBMITTALS

- A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work or a designated portion of the Work, submit written warranties upon request of the Architect.
  - 1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within fifteen (15) days of completion of that designated portion of the Work only when occupancy is substantially ahead of original planned occupancy and not identified in the schedule contained in the Contract Documents
- B. When a special warranty is required to be executed by the Contractor or the Contractor and a subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification ready for execution by the required parties. Submit a draft to the Owner through the Architect for approval prior to final execution.
  - 1. Refer to individual Sections of Divisions -2 through -33 for specific content requirements and particular requirements for submittal of special warranties.
- C. Form of Submittal: At Final Completion, compile one (1) hard copy and One (1) electronic copy of all required warranty and bond properly executed by the Contractor, or by the Contractor, subcontractor, supplier or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

- D. Hard Copy of warranties and bonds shall be bound in a heavy-duty, commercial quality, durable, 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents and sized to receive 8½" x 11" paper, with table of contents and numbered divider tabs.
  - 1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address and telephone number of the installer.
  - 2. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS," the Project title or name and the name of the Contractor, Architect and Date of Substantial Completion.
  
- E. Electronic copy of warranties and bonds shall be in PDF format with bookmarks of each section and delivered on a CD or DVD.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF WARRANTIES

- A. Schedule: Provide warranties and bonds on products and installations as indicated in Divisions 2 through – 28 of the Project Manual.

END OF SECTION

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## SECTION 017839 - PROJECT RECORD DOCUMENTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Miscellaneous record submittals.

## 1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set(s) of marked-up record prints.
  - 2. Number of Copies: Submit copies of record Drawings as follows:
    - a. Initial Submittal:
      - 1) Submit PDF electronic files of scanned record prints.
      - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    - b. Final Submittal:
      - 1) Submit PDF electronic files of scanned record prints and three set(s) of prints.
      - 2) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
  - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous



record- keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

## PART 2 - PRODUCTS

### 2.1 RECORD DRAWINGS

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

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Work Order numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect and Construction Manager.
    - e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

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

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.

3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as PDF electronic file(s).
1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

#### 2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file(s).
1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

### PART 3 - EXECUTION

#### 3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION

## SECTION 017900 - DEMONSTRATION AND TRAINING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
  - 3. Demonstration and training video recordings.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products.
- B. Qualification Data: For facilitator and instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.

## 1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

## 1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

## PART 2 - PRODUCTS

### 2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  - 2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Operations manuals.
    - c. Maintenance manuals.
    - d. Project record documents.
    - e. Identification systems.
    - f. Warranties and bonds.
    - g. Maintenance service agreements and similar continuing commitments.
  - 3. Emergencies: Include the following, as applicable:
    - a. Instructions on meaning of warnings, trouble indications, and error messages.
    - b. Instructions on stopping.
    - c. Shutdown instructions for each type of emergency.
    - d. Operating instructions for conditions outside of normal operating limits.
    - e. Sequences for electric or electronic systems.

- f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
  - a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
8. Repairs: Include the following:
  - a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF DOCUMENT

## SECTION 024100 - DEMOLITION

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Building demolition .

## 1.2 RELATED REQUIREMENTS

- A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

## 1.3 DEFINITIONS

- A. Demolition: Dismantle, raze, destroy or wreck any building or structure or any part thereof.
- B. Remove: Detach or dismantle items from existing construction and dispose of them off site, unless items are indicated to be salvaged or reinstalled.

## 1.4 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.

## 1.5 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Site Plan: Indicate:
  - 1. Areas for temporary construction and field offices.
- C. Demolition Plan: Submit demolition plan as required by OSHA and local AHJs.
  - 1. Indicate extent of demolition, removal sequencing, bracing and shoring, and location and construction of barricades and fences.
- D. Demolition firm qualifications.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.



## PART 3 EXECUTION

## 2.1 DEMOLITION

- A. Remove the entire buildings as indicated on drawings.
- B. Remove other items indicated.
- C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill.

## 2.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  - 3. Provide, erect, and maintain temporary barriers and security devices.
  - 4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  - 5. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
  - 6. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
  - 7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Hazardous Materials:
  - 1. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCBs, and mercury.
  - 2. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.

### 2.3 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

### 2.4 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

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## SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

## 1.2 RELATED REQUIREMENTS

- A. Section 032000 - Concrete Reinforcing.
- B. Section 033000 - Cast-in-Place Concrete.
- C. Section 042000 - Unit Masonry: Reinforcement for masonry.
- D. Section 051200 - Structural Steel Framing: Placement of embedded steel anchors and plates in cast-in-place concrete.

## 1.3 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary 2019 (Reapproved 2022).
- B. ACI PRC-347 - Guide to Formwork for Concrete 2014 (Reapproved 2021).
- C. ACI SPEC-117 - Specification for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).
- D. ACI SPEC-301 - Specifications for Concrete Construction 2020.
- E. PS 1 - Structural Plywood 2019.

## 1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver prefabricated forms and installation instructions in manufacturer's packaging.
- B. Store prefabricated forms off ground in ventilated and protected manner to prevent deterioration from moisture.

## PART 2 PRODUCTS

### 2.1 FORMWORK - GENERAL

- A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.
- B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.
- C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.
- D. Comply with relevant portions of ACI CODE-318, ACI PRC-347, and ACI SPEC-301.

### 2.2 WOOD FORM MATERIALS

- A. Form Materials: At the discretion of the Contractor.
- B. Softwood Plywood: PS 1, C Grade, Group 2.

### 2.3 REMOVABLE PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gauge, 0.0598 inch thick, matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Preformed Plastic Forms: Thermoplastic polystyrene form liner, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- C. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 2 inches thick. Provide \_\_\_\_\_ manufactured by \_\_\_\_\_.

### 2.4 FORMWORK ACCESSORIES

- A. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.
  - 1. Do not use materials containing diesel oil or petroleum-based compounds.

2. Composition: Colorless, reactive, water-based compound.
- B. Dowel Sleeves: Plastic sleeve and nailable plastic base for smooth, round, steel load-transfer dowels.
- C. Embedded Anchor Shapes, Plates, Angles and Bars: As specified in Section 051200.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

#### 3.2 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

#### 3.3 ERECTION - FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI SPEC-301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members that are not indicated on drawings.
- F. Coordinate this section with other sections of work that require attachment of components to formwork.
- G. If formwork is placed after reinforcement, resulting in insufficient concrete cover over reinforcement, request instructions from Architect before proceeding.

#### 3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

### 3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in passing through concrete work.
- B. Locate and set in place items that will be cast directly into concrete.
- C. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.
- D. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

### 3.6 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.

### 3.7 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI SPEC-117, unless otherwise indicated.

### 3.8 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

### 3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

END OF SECTION

SECTION 032000 - CONCRETE REINFORCING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

1.2 RELATED REQUIREMENTS

- A. Section 031000 - Concrete Forming and Accessories.
- B. Section 033000 - Cast-in-Place Concrete.
- C. Section 042000 - Unit Masonry: Reinforcement for masonry.

1.3 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Concrete Construction 2020.
- B. ACI SP-66 - ACI Detailing Manual 2004.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- E. CRSI (DA4) - Manual of Standard Practice 2018, with Errata (2019).

1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
- C. Manufacturer's Certificate: Certify that reinforcing steel and accessories supplied for this project meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

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



## PART 2 PRODUCTS

### 2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
  - 1. Deformed billet-steel bars.
  - 2. Unfinished.
- B. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M.
  - 1. Form: Flat Sheets.
- C. Reinforcement Accessories:
  - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
  - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

### 2.2 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is not permitted.
- C. Locate reinforcing splices not indicated on drawings at point of minimum stress.

## PART 3 EXECUTION

### 3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Comply with applicable code for concrete cover over reinforcement.

END OF SECTION

## SECTION 033000 - CAST-IN-PLACE CONCRETE

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Concrete formwork.
- B. Elevated concrete slabs.
- C. Floors and slabs on grade.
- D. Concrete foundation walls.
- E. Concrete reinforcement.
- F. Joint devices associated with concrete work.
- G. Concrete curing.

## 1.2 RELATED REQUIREMENTS

- A. Section 031000 - Concrete Forming and Accessories: Forms and accessories for formwork.
- B. Section 032000 - Concrete Reinforcing.
- C. Section 033511 - Concrete Floor Finishes: Densifiers, hardeners, applied coatings, and polishing.
- D. Section 079200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

## 1.3 REFERENCE STANDARDS

- A. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide 2022.
- B. ACI 301 - Specifications for Concrete Construction 2020.
- C. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.
- D. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- E. ACI 305R - Guide to Hot Weather Concreting 2020.
- F. ACI 306R - Guide to Cold Weather Concreting 2016.
- G. ACI 308R - Guide to External Curing of Concrete 2016.

- H. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).
- I. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- J. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.
- K. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.
- L. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens) 2021.
- M. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.
- N. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete 2020.
- O. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method 2016.
- P. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- Q. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete 2019.
- R. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).
- S. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2023, with Editorial Revision.
- T. ASTM C845/C845M - Standard Specification for Expansive Hydraulic Cement 2018.
- U. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2020.
- V. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.
- W. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.
- X. 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.
- Y. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs 2017.

#### 1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.

- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
  - 1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
- C. Mix Design: Submit proposed concrete mix design.
  - 1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
  - 2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.
- D. Samples: Submit samples of underslab vapor retarder to be used.
- E. Test Reports: Submit report for each test or series of tests specified.
- F. Sustainable Design Submittal: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete cast in place, mix design(s) used showing the quantity of portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.

## 1.5 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

## PART 2 PRODUCTS

### 2.1 FORMWORK

- A. Comply with requirements of Section 031000.

### 2.2 REINFORCEMENT MATERIALS

- A. Comply with requirements of Section 032000.
- B. Cement: ASTM C150/C150M, Type I - Normal Portland type.
  - 1. Acquire cement for entire project from same source.
- C. Blended, Expansive Hydraulic Cement: ASTM C845/C845M, Type K.

- D. Fine and Coarse Aggregates: ASTM C33/C33M.
  - 1. Acquire aggregates for entire project from same source.
- E. Fly Ash: ASTM C618, Class C or F.
- F. Calcined Pozzolan: ASTM C618, Class N.
- G. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

### 2.3 ADMIXTURES

- A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- B. Air Entrainment Admixture: ASTM C260/C260M.
- C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
- D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.
- F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- G. Accelerating Admixture: ASTM C494/C494M Type C.
- H. Retarding Admixture: ASTM C494/C494M Type B.
- I. Water Reducing Admixture: ASTM C494/C494M Type A.

### 2.4 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder:
  - 1. Sheet Material: ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single-ply polyethylene is prohibited.
  - 2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.
  - 3. Products:
    - a. Henry Company; Moistop Ultra 15: [www.henry.com/#sle](http://www.henry.com/#sle).
    - b. Stego Industries, LLC; Stego Wrap 15-mil (Class A): [www.stegoindustries.com/#sle](http://www.stegoindustries.com/#sle).
    - c. W. R. Meadows, Inc; PERMINATOR Class A - 15 mils (0.38 mm): [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).

- B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
  - 1. Grout: Comply with ASTM C1107/C1107M.
  - 2. Minimum Compressive Strength at 48 Hours, ASTM C109/C109M: 2,000 pounds per square inch.
  - 3. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.
  - 4. Products containing aluminum powder are not permitted.

## 2.5 BONDING AND JOINTING PRODUCTS

- A. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
  - 1. Material: ASTM D1751, cellulose fiber.
- B. Slab Contraction Joint Device: Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.
- C. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches on center; ribbed steel stakes for setting.

## 2.6 CURING MATERIALS

- A. Evaporation Reducer: Liquid thin-film-forming compound that reduces rapid moisture loss caused by high temperature, low humidity, and high winds; intended for application immediately after concrete placement.
- B. Curing Compound, Naturally Dissipating: Clear, water-based, liquid membrane-forming compound; complying with ASTM C309.
  - 1. Product dissipates within 4 to 6 weeks.
- C. Curing Agent, Water-Cure Equivalent Type: Clear, water-based, non-film-forming, liquid-water cure replacement agent.
  - 1. Comply with ASTM C309 standards for water retention.
  - 2. Comply with ASTM C309 standards for water retention.
  - 3. Compressive Strength of Treated Concrete: Equal to or greater than strength after 14-day water cure when tested according to ASTM C39/C39M.
  - 4. VOC Content: Zero.

- D. Moisture-Retaining Sheet: ASTM C171.
  - 1. Polyethylene film, white opaque, minimum nominal thickness of 4 mil, 0.004 inch.
  - 2. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.

## 2.7 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
  - 1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
  - 1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- D. Normal Weight Concrete:
  - 1. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  - 2. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
  - 3. Water-Cement Ratio: Maximum 40 percent by weight.
  - 4. Total Air Content: 4 percent, determined in accordance with ASTM C173/C173M.
  - 5. Maximum Slump: 3 inches.
  - 6. Maximum Aggregate Size: 3/4 inch.

## 2.8 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

## PART 3 EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- E. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.
  - 1. Vapor Retarder Over Granular Fill: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.

### 3.3 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

### 3.4 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- D. Ensure reinforcement, inserts, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- E. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.
- F. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.



### 3.5 SLAB JOINTING

- A. Locate joints as indicated on drawings and per industry standards.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.
- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.
- E. Contraction Joint Devices: Use preformed joint device, with top set flush with top of slab.
- F. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

### 3.6 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Maximum Variation of Surface Flatness:
  - 1. Exposed Concrete Floors: 1/4 inch in 10 feet.
  - 2. Under Seamless Resilient Flooring: 1/4 inch in 10 feet.
  - 3. Under Carpeting: 1/4 inch in 10 feet.
- B. Correct the slab surface if tolerances are less than specified.
- C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

### 3.7 CONCRETE FINISHING

- A. Repair surface defects, including tie holes, immediately after removing formwork.
- B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- C. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
  - 1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
- D. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
  - 1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.

2. Decorative Exposed Surfaces: Trowel as described in ACI 302.1R; take measures necessary to avoid black-burnish marks; decorative exposed surfaces include surfaces to be stained or dyed, pigmented concrete, surfaces to receive liquid hardeners, surfaces to receive dry-shake hardeners, surfaces to be polished, and all other exposed slab surfaces.
- E. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

### 3.8 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
1. Normal concrete: Not less than seven days.
- C. Surfaces Not in Contact with Forms:
1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
  2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
    - a. Spraying: Spray water over floor slab areas and maintain wet.
  3. Final Curing: Begin after initial curing but before surface is dry.
    - a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.
    - b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

### 3.9 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

- D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.
- F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

### 3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

### 3.11 PROTECTION

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

END OF SECTION

SECTION 033511 - CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surface treatments for concrete floors and slabs.
- B. Liquid densifiers and hardeners.
- C. Clear coatings.
- D. Clear penetrating sealers.

1.2 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.
- B. Section 096700 - Fluid-Applied Flooring.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with concrete floor placement and concrete floor curing.

1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.
- D. Warranty Documentation: Manufacturer warranty; ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

## 1.6 FIELD CONDITIONS

- A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.
- B. Do not finish floors until interior heating system is operational.
- C. Maintain ambient temperature of 50 degrees F minimum.

## 1.7 WARRANTY

- A. See Section 017830 - Warranties and Bonds, for additional warranty requirements.
- B. Correct defective work within a two-year period commencing on the Date of Substantial Completion.
- C. Finish Warranty: Provide five-year manufacturer warranty against excessive degradation of finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

## PART 2 PRODUCTS

### 2.1 CONCRETE FLOOR FINISH APPLICATIONS

- A. Unless otherwise indicated, all concrete floors are to be finished using liquid densifier/hardener.

### 2.2 SURFACE TREATMENTS

- A. Troweling Aid, Densifier and Curing Agent: Liquid reactive colloidal silica-based topical treatment, spray-applied to wet concrete and floated or troweled into the surface.
  - 1. Product:
    - a. Forta Corporation; EXTEND-PRO: [www.forta-ferro.com/#sle](http://www.forta-ferro.com/#sle).
    - b. Penetron; Peneseal FH-PS: [www.penetron.com/#sle](http://www.penetron.com/#sle).
    - c. Solomon Colors; Solomon Colors Lythic Day1: [www.solomoncolors.com/#sle](http://www.solomoncolors.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.

### 2.3 DENSIFIERS AND HARDENERS

- A. Liquid Densifier and Hardener: Penetrating chemical compound that reacts with concrete, filling the pores, hardening, and dustproofing.
  - 1. Composition: Lithium silicate.
  - 2. Products:

- a. Kaufman Products Inc; SureHard LS: [www.kaufmanproducts.net/#sle](http://www.kaufmanproducts.net/#sle).
  - b. PROSOCO, Inc; ColorHard used with Consolideck LS or LS/CS: [www.prosoco.com/consolideck/#sle](http://www.prosoco.com/consolideck/#sle).
  - c. Sinak Corporation; LithoHard: [www.sinak.com/#sle](http://www.sinak.com/#sle).
  - d. SpecChem, LLC; LithSeal SC: [www.specchemllc.com/#sle](http://www.specchemllc.com/#sle).
  - e. W. R. Meadows, Inc; Liqui-Hard Ultra: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
  - f. Substitutions: See Section 016000 - Product Requirements.
3. Composition: Sodium silicate.
- a. Products:
    - 1) Euclid Chemical Company; EUCO DIAMOND HARD: [www.euclidchemical.com/#sle](http://www.euclidchemical.com/#sle).
    - 2) Kaufman Products Inc; SureHard: [www.kaufmanproducts.net/#sle](http://www.kaufmanproducts.net/#sle).
    - 3) Mapei Corporation; Mapecrete Hard SB: [www.mapei.com/#sle](http://www.mapei.com/#sle).
    - 4) Sinak Corporation; Sealer SG: [www.sinak.com/#sle](http://www.sinak.com/#sle).
    - 5) SpecChem, LLC; Cure Hard: [www.specchemllc.com/#sle](http://www.specchemllc.com/#sle).
    - 6) W. R. Meadows, Inc; Liqui-Hard: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
    - 7) Substitutions: See Section 016000 - Product Requirements.

## 2.4 COATINGS

- A. Low Gloss Clear Coating (Sealed Concrete): Transparent, nonyellowing, acrylic polymer-based coating.
1. Composition: Solvent-based.
  2. Nonvolatile Content: 20 percent, minimum, when measured by volume.
  3. Products:
    - a. Clemons Concrete Coatings: [www.clemonsconcretecoatings.com/#sle](http://www.clemonsconcretecoatings.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
  4. Composition: Water-based.
    - a. Nonvolatile Content: 20 percent, minimum, when measured by volume.

- b. Products:
  - 1) Concrete Sealers USA; TS202: [www.concretesealersusa.com/#sle](http://www.concretesealersusa.com/#sle).
  - 2) Concrete Sealers USA; TS210: [www.concretesealersusa.com/#sle](http://www.concretesealersusa.com/#sle).
  - 3) Substitutions: See Section 016000 - Product Requirements.
- B. Clear Coating (Epoxy Flooring): Clear coating recommended by manufacturer for finishing concrete floors and slabs.
  - 1. Gloss: Matte.
  - 2. Color(s): As selected by Architect from manufacturer's full range.
  - 3. Type: High solids epoxy; two-component.
    - a. Products:
      - 1) SureCrete Design Products: [www.surecretedesign.com/#sle](http://www.surecretedesign.com/#sle).
      - 2) Stonhard: [www.stonhard.com/#sle..](http://www.stonhard.com/#sle..)
      - 3) Spartan Epoxies: [www.spartanepoxies.com/#sle..](http://www.spartanepoxies.com/#sle..)
      - 4) Substitutions: See Section 016000 - Product Requirements.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

### 3.2 GENERAL

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

### 3.3 COATING APPLICATION

- A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.

- C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

END OF SECTION



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## SECTION 042000 - UNIT MASONRY

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Concrete block.
- B. Common brick.
- C. Hollow brick.
- D. Mortar and grout.
- E. Reinforcement and anchorage.
- F. Flashings.
- G. Lintels.
- H. Accessories.

## 1.2 RELATED REQUIREMENTS

- A. Section 032000 - Concrete Reinforcing: Reinforcing steel for grouted masonry.
- B. Section 033000 - Cast-in-Place Concrete: Installation of dovetail slots for masonry anchors.
- C. Section 061000 - Rough Carpentry: Nailing strips built into masonry.
- D. Section 072100 - Thermal Insulation: Insulation for cavity spaces.
- E. Section 072123 - Loose-Fill Insulation: Granular insulation for masonry unit cores.
- F. Section 072700 - Air Barriers: Air barriers applied to exterior face of backing sheathing or unit masonry substrate.
- G. Section 078400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
- H. Section 079200 - Joint Sealants: Sealing control and expansion joints.

## 1.3 REFERENCE STANDARDS

- A. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.

- B. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire 2019.
- C. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement 2022.
- D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- E. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile 2021.
- F. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2022.
- G. ASTM C91/C91M - Standard Specification for Masonry Cement 2023.
- H. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units 2022.
- I. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar 2018.
- J. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- K. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2018.
- L. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- M. ASTM C404 - Standard Specification for Aggregates for Masonry Grout 2018.
- N. ASTM C476 - Standard Specification for Grout for Masonry 2023.
- O. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale) 2022.
- P. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.
- Q. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength 2022.
- R. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms 2023.
- S. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry 2019a.
- T. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover 2008a (Reapproved 2019).
- U. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry 2020.
- V. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.
- W. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls 2017.
- X. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls 2005.

- Y. BIA Technical Notes No. 46 - Maintenance of Brick Masonry 2017.
- Z. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2022.
- AA. UL (FRD) - Fire Resistance Directory Current Edition.

#### 1.4 ADMINISTRATIVE REQUIREMENTS

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

#### 1.5 SUBMITTALS

- A. See Section 013300 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.
- D. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.
- E. Test Reports: Concrete masonry manufacturer's test reports for units with integral water repellent admixture.
- F. Installer's Qualification Statement.

#### 1.6 QUALITY ASSURANCE

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Fire Rated Assemblies: Comply with applicable code for UL (FRD) Assembly No. U906.
- C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of experience.
- D. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.

#### 1.7 MOCK-UPS

- A. Construct a masonry wall as a mock-up panel sized 8 feet long by 6 feet high; include in mock-up.
- B. Locate where directed.

- C. Mock-up may remain as part of work.

## 1.8 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

### 2.1 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:

1. Size: Architectural units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
2. Special Shapes: Provide nonstandard blocks configured for corners.
  - a. Provide bullnose units for outside corners where located on the drawings.
3. Load-Bearing Units: ASTM C90, normal weight.
  - a. Hollow block, as indicated.
  - b. Exposed Faces: Manufacturer's standard color and texture where indicated.
4. Nonloadbearing Units: ASTM C129.
  - a. Hollow block, as indicated.
5. Units with Integral Water Repellent: Concrete block units as specified in this section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.
  - a. Performance of Units with Integral Water Repellent:
    - 1) Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours.
      - a) No water visible on back of wall above flashing at the end of 24 hours.
      - b) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
      - c) No more than 25 percent of wall area above flashing visibly damp at end of test.
    - 2) Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
    - 3) Compressive Strength: ASTM C1314; maximum 5 percent decrease.

- b. Use only in combination with mortar that also has integral water repellent admixture.
- c. Use water repellent admixtures for masonry units and mortar by a single manufacturer.

## 2.2 BRICK UNITS

### A. Manufacturers:

1. General Shale Brick: [www.generalshale.com/#sle](http://www.generalshale.com/#sle).
2. Meridian Brick LLC; Athens Architectural Series: [www.meridianbrick.com/#sle](http://www.meridianbrick.com/#sle).
3. Boren Brick.
4. Substitutions: See section 016000 - Product Requirements.

### B. Hollow Facing and Building Brick: ASTM C652, Grade SW; Type HBS; Class H40V or H60V, as required by conditions.

1. Color and texture to match Owner's sample.
2. Nominal size: As indicated on drawings.
3. Compressive strength: As indicated on drawings, measured in accordance with ASTM C67/C67M.

## 2.3 MORTAR AND GROUT MATERIALS

### A. Masonry Cement: ASTM C91/C91M, Type N.

1. Colored Mortar: Premixed cement as required to match Architect's color sample.

### B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.

### C. Hydrated Lime: ASTM C207, Type S.

### D. Mortar Aggregate: ASTM C144.

### E. Grout Aggregate: ASTM C404.

### F. 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.
2. Manufacturers:
  - a. Davis Colors, a division of Venator Materials PLC: [www.daviscolors.com/#sle](http://www.daviscolors.com/#sle).
  - b. Lambert Corporation: [www.lambertusa.com/#sle](http://www.lambertusa.com/#sle).

- c. Solomon Colors, Inc: [www.solomoncolors.com/#sle](http://www.solomoncolors.com/#sle).
  - d. Substitutions: See Section 016000 - Product Requirements.
- G. Water: Clean and potable.
- H. Accelerating Admixture: Nonchloride type for use in cold weather.
- I. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.
- 1. Use only in combination with masonry units manufactured with integral water repellent admixture.
  - 2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
  - 3. Meet or exceed performance specified for water repellent admixture used in masonry units.
- J. 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. Type: Type N.
  - 2. Color: Mineral pigments added as required to produce approved color sample.
  - 3. Water-repellent mortar for use with water repellent masonry units.
- K. Packaged Dry Material for Mortar for Repointing: Premixed Portland cement, hydrated lime, and graded sand; capable of producing Type O mortar in accordance with ASTM C270 with the addition of water only.
- 1. Color: Mineral pigments added as required to produce approved color sample.
- L. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
- 1. Type: Fine.

## 2.4 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers:
- 1. Blok-Lok Limited: [www.blok-lok.com/#sle](http://www.blok-lok.com/#sle).
  - 2. Hohmann & Barnard, Inc; X-Seal Anchor: [www.h-b.com/#sle](http://www.h-b.com/#sle).
  - 3. WIRE-BOND [www.wirebond.com/#sle](http://www.wirebond.com/#sle).

4. Substitutions: See Section 016000 - Product Requirements.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi), deformed billet bars; galvanized.
- C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- D. Single Wythe Joint Reinforcement: ASTM A951/A951M.
  1. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.
- E. Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
  1. Type: Ladder.
  2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
  3. Size: 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.

## 2.5 FLASHINGS

- A. Flashing - Weep - Vent System for single-wythe CMU: Polypropylene pan and bridge unit with polyester mesh drainage mats and bug guards; wall system size: as indicated.
  1. Install CMU cell flashing pans with built in adjoining bridge made from recycled polypropylene with chemical stabilizers that prevent UV degradation. Flashing pans have a sloped design to direct moisture to the integrated weep spout. Designed to be built into mortar bed joints to expel moisture (unimpeded by mortar droppings) to the exterior of CMU walls. Drainage Mats and Insect Guards included.

Manufacturers:

Mortar Net Solutions; Blockflash: [www.mortarnet.com/#sle](http://www.mortarnet.com/#sle)

Substitutions: See Section 016000 - Product Requirements.

- B. Metal Flashing Materials:
- C. Combination Nonasphaltic Flashing Materials - Copper:
  1. Copper/Polymer Film or Fabric Flashing: 3 oz/sq ft copper sheet laminated between two sheets of polyethylene film. Minimum Puncture Resistance of 780 psi, when measured in accordance with ASTM E154/E154M.
    - a. Manufacturers:
    - b. Hohmann & Barnard, Inc: [www.h-b.com/#sle](http://www.h-b.com/#sle).
    - c. STS Coatings, Inc: [www.stscoatings.com/#sle](http://www.stscoatings.com/#sle).



- d. WIRE-BOND: [www.wirebond.com/#sle](http://www.wirebond.com/#sle).
  - e. York Manufacturing, Inc: [www.yorkmfg.com/#sle](http://www.yorkmfg.com/#sle).
  - f. Substitutions: See Section 016000 - Product Requirements.
- D. Membrane Asphaltic Flashing Materials:
- 1. Rubberized Asphalt Flashing: Self-adhering polymer modified asphalt sheet; 40 mils (0.040 inch) minimum total thickness; 8 mil cross-laminated polyethylene bonded to adhesive rubberized asphalt, with a removable release liner.
    - a. Manufacturers:
      - 1) Advanced Building Products, Inc: [www.advancedbuildingproducts.com/#sle](http://www.advancedbuildingproducts.com/#sle).
      - 2) Heckmann Building Products, Inc: [www.heckmannbuildingprods.com/#sle](http://www.heckmannbuildingprods.com/#sle)
      - 3) WIRE-BOND: [www.wirebond.com/#sle](http://www.wirebond.com/#sle).
      - 4) York Manufacturing, Inc; York Seal: [www.yorkmfg.com/#sle](http://www.yorkmfg.com/#sle).
      - 5) Substitutions: See Section 016000 - Product Requirements.
- E. Factory-Fabricated Flashing Corners and End Dams: Stainless steel.
- 1. Manufacturers:
    - a. Hohmann & Barnard, Inc: [www.h-b.com/#sle](http://www.h-b.com/#sle).
    - b. Mortar Net Solutions; CompleteFlash: [www.mortarnet.com/#sle](http://www.mortarnet.com/#sle).
    - c. York Manufacturing, Inc: [www.yorkmfg.com/#sle](http://www.yorkmfg.com/#sle).
- F. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.
- G. Termination Bars: compatible with membrane and adhesives.
- 1. Manufacturers:
    - a. Hohmann & Barnard, Inc: [www.h-b.com/#sle](http://www.h-b.com/#sle).
    - b. Mortar Net Solutions: [www.mortarnet.com/#sle](http://www.mortarnet.com/#sle).
    - c. York Manufacturing, Inc: [www.yorkmfg.com/#sle](http://www.yorkmfg.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
- H. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.

## 1. Manufacturers:

- a. Hohmann & Barnard, Inc: [www.h-b.com/#sle](http://www.h-b.com/#sle).
- b. Mortar Net Solutions: [www.mortarnet.com/#sle](http://www.mortarnet.com/#sle).
- c. York Manufacturing, Inc: [www.yorkmfg.com/#sle](http://www.yorkmfg.com/#sle).

- I. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

## 2.6 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.

## 1. Manufacturers:

- a. Blok-Lok Limited: [www.blok-lok.com/#sle](http://www.blok-lok.com/#sle).
- b. Hohmann & Barnard, Inc: [www.h-b.com/#sle](http://www.h-b.com/#sle).
- c. WIRE-BOND: [www.wirebond.com/#sle](http://www.wirebond.com/#sle).
- d. Substitutions: See Section 016000 - Product Requirements.

- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.

## 1. Manufacturers:

- a. Hohmann & Barnard, Inc: [www.h-b.com/#sle](http://www.h-b.com/#sle).
- b. WIRE-BOND: [www.wirebond.com/#sle](http://www.wirebond.com/#sle).
- c. Substitutions: See Section 016000 - Product Requirements.

- 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.

## 1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.

## a. Manufacturers:

- 1) Advanced Building Products, Inc; Mortar Break  
DT: [www.advancedbuildingproducts.com/#sle](http://www.advancedbuildingproducts.com/#sle).
- 2) Advanced Building Products Inc; Mortar  
Break: [www.advancedbuildingproducts.com/#sle](http://www.advancedbuildingproducts.com/#sle).
- 3) Mortar Net Solutions; MortarNet: [www.mortarnet.com/#sle](http://www.mortarnet.com/#sle).

- 4) York Manufacturing, Inc: [www.yorkmfg.com/#sle](http://www.yorkmfg.com/#sle).
- 5) Substitutions: See Section 016000 - Product Requirements.

D. Weeps:

1. Type: Extruded propylene with honeycomb design.
2. Color(s): As selected by Architect from manufacturer's full range.
3. Manufacturers:
  - a. Advanced Building Products, Inc: [www.advancedbuildingproducts.com/#sle](http://www.advancedbuildingproducts.com/#sle).
  - b. Blok-Lok Limited: [www.blok-lok.com/#sle](http://www.blok-lok.com/#sle).
  - c. CavClear, a Division of Archovations Inc: [www.cavclear.com/#sle](http://www.cavclear.com/#sle).
  - d. Hohmann & Barnard, Inc: [www.h-b.com/#sle](http://www.h-b.com/#sle).
  - e. Mortar Net Solutions; WeepVent: [www.mortarnet.com/#sle](http://www.mortarnet.com/#sle).
  - f. WIRE-BOND: [www.wirebond.com/#sle](http://www.wirebond.com/#sle).

E. Drainage Fabric: Polyester or polypropylene mesh bonded to a water and vapor-permeable fabric.

1. Manufacturers:
  - a. Mortar Net Solutions; DriPlane: [www.mortarnet.com/#sle](http://www.mortarnet.com/#sle).
  - b. York Manufacturing, Inc; Weep Armor Weep Vent Protection: [www.yorkmfg.com/#sle](http://www.yorkmfg.com/#sle).
  - c. Substitutions: See Section 016000 - Product Requirements.

F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

## 2.7 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Property Specification.

1. Masonry below grade and in contact with earth: Type S.
2. Exterior, loadbearing masonry: Type N.
3. Exterior, non-loadbearing masonry: Type N.
4. Interior, loadbearing masonry: Type N.
5. Interior, non-loadbearing masonry: Type O.

- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
- D. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- E. Mixing: Use mechanical batch mixer and comply with referenced standards.

### PART 3 EXECUTION

#### 3.1 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.

#### 3.2 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.

#### 3.3 COLD AND HOT WEATHER REQUIREMENTS

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

#### 3.4 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.
3. Mortar Joints: Concave.

D. Brick Units:

1. Bond: Running.
2. Coursing: Three units and three mortar joints to equal 8 inches.
3. Mortar Joints: Concave.

### 3.5 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- F. Interlock intersections and external corners.
- G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- I. Cut mortar joints flush where resilient base is scheduled or fluid-applied air barrier is applied.

### 3.6 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.
- B. Install single-wythe pan flashing in all open cells where indicated on drawings.

### 3.7 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.

3.8 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHE MASONRY, AND CAVITY WALL MASONRY

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Lap joint reinforcement ends minimum 6 inches.
- C. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches with at least 5/8 inch mortar cover to the outside face of the anchor.

3.9 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE UNIT MASONRY

- A. Use individual metal ties installed in horizontal joints to bond wythes together. Provide ties spaced as indicated on drawings.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

3.10 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, minimum, into adjacent masonry or turn up flashing ends at least 1 inch, 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 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. Extend metal flashings to within 1/2 inch of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.
- E. Support flexible flashings across gaps and openings.
- F. Extend laminated and EPDM flashings to within 1/2 inch of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.
- G. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

### 3.11 GROUTED COMPONENTS

- A. Reinforce bond beams with 1, No. 5 bar, 1 inch from bottom web.
- B. Lap splices minimum 24 bar diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.

### 3.12 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.

### 3.13 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames, glazed frames, and anchor bolts 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 from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

### 3.14 TOLERANCES

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

3.15 CUTTING AND FITTING

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.16 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.

3.17 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.

3.18 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 047200 - CAST STONE MASONRY

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Architectural cast stone.
- B. Units required are indicated on drawings as "cast stone".

## 1.2 RELATED REQUIREMENTS

- A. Section 042000 - Unit Masonry: Installation of cast stone in conjunction with masonry.
- B. Section 079200 - Joint Sealants: Sealing joints indicated to be left open for sealant.

## 1.3 REFERENCE STANDARDS

- A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary 2019 (Reapproved 2022).
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2019.
- D. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement 2019, with Editorial Revision (2020).
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- F. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- G. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- H. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- I. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).
- J. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.
- K. ASTM C1364 - Standard Specification for Architectural Cast Stone 2023.

#### 1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
- C. Mortar Color Selection Samples.
- D. Verification Samples: Pieces of actual cast stone components not less than 6 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.
- E. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
  - 1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
  - 2. Manufacturer's production facility currently holds a Plant Certification from the Cast Stone Institute or the Architectural Precast Association.
  - 3. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

#### 1.6 MOCK-UPS

- A. Provide full size cast stone components for installation in mock-up of exterior wall.
- B. See Section 014000 - Quality Requirements for additional requirements.
- C. Approved mock-up will become standard for appearance and workmanship.
- D. Mock-up may remain as part of the completed work.
- E. Remove mock-up not incorporated into the work and dispose of debris.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- B. Number each piece individually to match shop drawings and schedule.
- C. Store cast stone components and installation materials in accordance with manufacturer's instructions.

- D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- F. Store mortar materials where contamination can be avoided.
- G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Architectural Cast Stone:
  - 1. Any current producer member of the Architectural Precast Association.
  - 2. Any current producer member of the Cast Stone Institute.
  - 3. Substitutions: See Section 016000 - Product Requirements.

### 2.2 ARCHITECTURAL CAST STONE

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural granite, complying with ASTM C1364.
  - 1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
  - 2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
  - 3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
  - 4. Color: Selected by Architect from manufacturer's full range.
  - 5. Remove cement film from exposed surfaces before packaging for shipment.
- B. Shapes: Provide shapes indicated on drawings.
  - 1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
  - 2. Unless otherwise indicated on drawings, provide:
    - a. Wash or slope of 1:12 on exterior horizontal surfaces.

- b. Drips on projecting components, wherever possible.
  - c. Raised fillets at back of sills and at ends to be built in.
- C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI CODE-318.

## 2.3 MATERIALS

- A. Portland Cement: ASTM C150/C150M.
- 1. For Units: Type I or II, white.
  - 2. For Mortar: Type I or II, except Type III may be used in cold weather.
- B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
- D. Pigments: ASTM C979, inorganic iron oxides; do not use carbon black.
- E. Admixtures: ASTM C494/C494M.
- F. Water: Potable.
- G. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi), deformed bars, galvanized.
- 1. Galvanized in accordance with ASTM A767/A767M, Class I.
- H. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
- I. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- J. Mortar: Portland cement-lime, as specified in Section 040511 ; do not use masonry cement.
- K. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.

- B. Do not begin installation until unacceptable conditions have been corrected.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cast stone components in conjunction with masonry, complying with requirements of Section 042000.
- C. Mechanically anchor each cast stone unit.
- D. Setting:
  - 1. Drench cast stone components with clear, running water immediately before installation.
  - 2. Set units in a full bed of mortar unless otherwise indicated.
  - 3. Fill vertical joints with mortar.
  - 4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

### 3.3 TOLERANCES

- A. Joints: Make all joints 3/8 inch, except as otherwise detailed.
  - 1. Rake mortar joints 3/4 inch for pointing.
  - 2. Remove excess mortar from face of stone before pointing joints.
  - 3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
  - 4. Leave the following joints open for sealant:
    - a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
    - b. Joints in projecting units.
    - c. Joints between rigidly anchored units, including soffits, panels, and column covers.
    - d. Joints below lugged sills and stair treads.
    - e. Joints below ledge and relieving angles.
    - f. Joints labeled "expansion joint".
- B. Installation Tolerances:
  - 1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.

2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

#### 3.4 REPAIR

- A. Repair chips and other surface damage noticeable when viewed in direct daylight at 10 feet.
- B. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.
- C. Repair methods and results subject to Architect 's approval.

#### 3.5 CLEANING

- A. Keep cast stone components clean as work progresses.
- B. Clean completed exposed cast stone after mortar is thoroughly set and cured.
  1. Wet surfaces with water before applying cleaner.
  2. Apply cleaner to cast stone in accordance with manufacturer's instructions.
  3. Remove cleaner promptly by rinsing thoroughly with clear water.
  4. Do not use acidic cleaners.

#### 3.6 PROTECTION

- A. Protect completed work from damage.
- B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

## SECTION 051200 - STRUCTURAL STEEL FRAMING

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Structural steel framing members.
- B. Base plates, shear stud connectors and expansion joint plates.
- C. Grouting under base plates.

## 1.2 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual 2017.
- B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges 2022.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- D. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished 2018.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- 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 A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric) 2021a.
- I. ASTM A992/A992M - Standard Specification for Structural Steel Shapes 2022.
- J. ASTM E94/E94M - Standard Guide for Radiographic Examination Using Industrial Radiographic Film 2017.
- K. ASTM E164 - Standard Practice for Contact Ultrasonic Testing of Weldments 2019.
- L. ASTM E165/E165M - Standard Practice for Liquid Penetrant Testing for General Industry 2018.
- M. ASTM E709 - Standard Guide for Magnetic Particle Testing 2021.
- N. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions 2019.



- O. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength 2020.
- P. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2022.
- Q. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.
- R. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- S. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections 2020.
- T. SSPC-SP 3 - Power Tool Cleaning 2018.

### 1.3 SUBMITTALS

- A. See Section 01330 for submittal procedures.
- B. Shop Drawings:
  - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
  - 2. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- C. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.

### 1.4 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Steel W Shapes and Tees: ASTM A992/A992M.
- C. Rolled Steel Structural Shapes: ASTM A992/A992M.
- D. Cold-Formed Structural Tubing: ASTM A500/A500M, Grade C.

- E. Shear Stud Connectors: Made from ASTM A108 Grade 1015 bars.
- F. Structural Bolts and Nuts: Carbon steel, ASTM A307, Grade A and galvanized in compliance with ASTM A153/A153M Class C.
- G. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563/A563M nuts and ASTM F436/F436M washers.
- H. Tension Control Bolts: Twist-off type; ASTM F3125/F3125M.
- I. Unheaded Anchor Rods: ASTM F1554, Grade 36, plain, with matching ASTM A563/A563M nuts and ASTM F436/F436M Type 1 washers.
- J. Headed Anchor Rods: ASTM F1554 Grade 36, plain.
- K. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
  - 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
  - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
- L. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

## 2.2 FABRICATION

- A. Shop fabricate to greatest extent possible.
- B. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- C. Fabricate connections for bolt, nut, and washer connectors.

## 2.3 FINISH

- A. Prepare structural component surfaces in accordance with SSPC-SP 3.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded, in contact with concrete, or high strength bolted.

## 2.4 SOURCE QUALITY CONTROL

- A. Welded Connections: Visually inspect all shop-welded connections and test at least 10 percent of welds using one of the following:
  - 1. Radiographic testing performed in accordance with ASTM E94/E94M.
  - 2. Ultrasonic testing performed in accordance with ASTM E164.

3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
4. Magnetic particle inspection performed in accordance with ASTM E709.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

#### 3.2 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts".
- D. Do not field cut or alter structural members without approval of Architect.
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.
- F. Grout solidly between column plates and bearing surfaces, complying with manufacturer's instructions for nonshrink grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

#### 3.3 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

#### 3.4 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. High-Strength Bolts: Provide testing and verification of field-bolted connections in accordance with RCSC (HSBOLT) "Specification for Structural Joints Using High-Strength Bolts," testing at least 10 percent of bolts at each connection.

- C. Welded Connections: Visually inspect all field-welded connections and test at least 10 percent of welds using one of the following:
1. Radiographic testing performed in accordance with ASTM E94/E94M.
  2. Ultrasonic testing performed in accordance with ASTM E164.
  3. Liquid penetrant inspection performed in accordance with ASTM E165/E165M.
  4. Magnetic particle inspection performed in accordance with ASTM E709.

END OF SECTION

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## SECTION 051213 - ARCHITECTURALLY-EXPOSED STRUCTURAL STEEL FRAMING

## PART 1 GENERAL

## 1.1 RELATED REQUIREMENTS

- A. Section 051200 - Structural Steel Framing: General requirements for structural steel members, including AESS framing specified in this section.
- B. Section 099113 - Exterior Painting: Finish coat requirements and coordination with primer and surface preparation specified in this section.
- C. Section 099123 - Interior Painting: Finish coat requirements and coordination with primer and surface preparation specified in this section.
- D. Section 099600 - High-Performance Coatings: Finish coat requirements and coordination with primer and surface preparation specified in this section.

## 1.2 REFERENCE STANDARDS

- A. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges 2022.
- B. AISC 360 - Specification for Structural Steel Buildings 2022.
- C. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling 2022.
- D. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.
- E. ASTM A1085/A1085M - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS) 2015.
- F. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2022.
- G. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.
- H. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- J. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- K. SSPC-SP 6 - Commercial Blast Cleaning 2007.

### 1.3 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product data for each type of product specified. Submit paint systems in accordance with Section 099113.
- C. Shop Drawings: Detailing for fabrication of AESS components.
  - 1. Provide erection documents clearly indicating which members are AESS members and the AESS category of each part.
  - 2. Include details that clearly identify AESS requirements found in this specification. Provide connections for AESS consistent with concepts shown on drawings.
  - 3. Indicate welds by AWS A2.4 symbols, distinguishing between shop and field welds, and show size, length and type of each weld. Identify grinding, finish and profile of welds as defined by the designated AESS category.
  - 4. Indicate orientation of hollow structural section (HSS) seams and mill marks (where applicable).
  - 5. Indicate special tolerances and erection requirements as noted on drawings or defined by the designated AESS category.
- D. AESS 2 Samples: Provide samples of specific AESS characteristics. Samples may be small size samples or components of conventional structural steel demonstrating specific AESS characteristics, including surface preparation, sharp edges ground smooth, continuous weld appearance, weld show through, and fabrication mark removal.
- E. 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.

### 1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: In addition to those qualifications listed in Section 051200, engage an AISC Certified Fabricator, experienced in fabricating AESS similar to that indicated for this project with a record of successful in-service performance, as well as sufficient production capacity to fabricate AESS without delaying the work.
- B. Erector Qualifications: In addition to those qualifications listed in Section 051200, engage an AISC Certified Erector, experienced in erecting AESS work similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.
- C. Welder Qualifications: Welding processes and welding operators qualified within previous 12 months in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work.

## PART 2 PRODUCTS

### 2.1 GENERAL REQUIREMENTS

- A. Comply with Section 051200, except as amended in this section for aesthetic purposes.

### 2.2 FABRICATION

- A. Fabricate and assemble AESS in shop to greatest extent possible. Locate field joints in AESS assemblies at concealed locations or as approved by Architect. Detail AESS assemblies to minimize field handling and expedite erection.
- B. Permissible tolerances for member depth, width, out of square, and camber and sweep to be as specified in ASTM A6/A6M, ASTM A500/A500M, and ASTM A1085/A1085M.
- C. Use special care in handling and shipping of AESS both before and after shop painting to minimize damage to any shop finish. Use nylon-type slings or softeners when using chains or wire rope slings.
- D. Bolted Connections:
  - 1. Make in accordance with Section 051200. Provide bolt type and finish as noted herein.
- E. Welded Connections:
  - 1. Comply with AWS D1.1/D1.1M and Section 051200.
- F. Surface Preparation:
  - 1. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
- G. Fabricate AESS in accordance with categories defined in AISC 303, as follows:
  - 1. AESS 2: Feature elements viewed at a distance greater than 20 feet (feature elements not in close view).

### 2.3 PAINT SYSTEM

- A. Compatibility: All components/procedures of AESS paint system to comply with coating system specified, submitted, and approved per Sections 099113, 099123, and 099600. As a minimum, identify required surface preparation, primer, intermediate coat (if applicable), and finish coat. Primer, intermediate coating, and finish coating to be from a single manufacturer combined in a system documented by manufacturer with adequate guidance for fabricator to procure and execute.
- B. Primer: As specified in Sections 099113, 099123, and 099600. Primer to comply with all federal standards for VOC, lead and chromate levels.
- C. Finish Coating: Field apply intermediate and top coats per Sections 099113, 099123, and 099600.



## 2.4 SHOP PRIMING

### A. Surface Preparation:

1. Provide surface preparations to meet SSPC-SP 6.
2. Coordinate required surface profile with approved paint submittal prior to beginning surface preparation.
3. Prior to blasting, remove any grease and oil using solvent cleaning to meet SSPC-SP 1.
4. Remove weld spatter, slivers and similar surface discontinuities.
5. Ease sharp corners resulting from shearing, flame cutting or grinding.

### B. Priming: Immediately after surface preparation, apply primer according to manufacturer's instructions to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

## 2.5 MATERIALS

### A. General: Meet requirements of 051200 as amended below.

### B. Tension Control, High-Strength Bolts, Nuts, and Washers: Per section 051200, Tension Control Bolts. Provide standard carbon steel finish rounded bolt heads with twist off bolts; ASTM F3125/F3125M.

## PART 3 EXECUTION

### 3.1 ERECTION

#### A. AESS 1 and 2: Basic elements; feature elements not in close view:

1. Employ special care to handle and erect AESS. Erect finished pieces using nylon straps or chains with softeners such that they are not damaged.
2. Place weld tabs for temporary bracing and safety cabling at points concealed from view in completed structure or where approved by Architect during pre-installation meeting. Obtain Architect approval of methods for removing temporary devices and finishing AESS members prior to erection.
3. AESS Erection Tolerances: Erect to standard frame tolerances for structural steel per Chapter 7 of AISC 303.
4. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
5. Remove blemishes or unsightly surfaces resulting from temporary braces or fixtures.
6. Remove all backing and run out tabs.

7. When temporary braces or fixtures are required to facilitate erection, take care to avoid any blemishes, holes or unsightly surfaces resulting from use or removal of such temporary elements.
8. Bolted Connections: Align bolt heads on same side of connection as indicated on approved fabrication or erection documents.
9. Welded Connections: Comply with AWS D1.1/D1.1M and Section 051200. Appearance and quality of welds to be consistent. Employ methods that will maintain alignment of members without warp exceeding tolerance of this section.
10. Remove weld spatter exposed to view.
11. Grind off projections larger than 1/16 inch at field butt and plug welds.
12. Continuous Welds: Where continuous welding is noted on drawings, provide continuous welds of a uniform size and profile.
13. Do not enlarge holes in members by burning or by using drift pins. Ream holes that must be enlarged to admit bolts. Replace connection plates that are misaligned where holes cannot be aligned with acceptable final appearance.

END OF SECTION

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## SECTION 054000 - COLD-FORMED METAL FRAMING

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Formed steel stud exterior wall framing.
- B. Exterior wall sheathing.

## 1.2 RELATED REQUIREMENTS

- A. Section 072100 - Thermal Insulation: Insulation within framing members.
- B. Section 072700- Air Barriers: Air, vapor, and water barrier over sheathing.
- C. Section 076200 - Sheet Metal Flashing and Trim: Head and sill flashings.
- D. Section 079200 - Joint Sealants.
- E. Section 092116 - Gypsum Board Assemblies: Cold-formed steel nonstructural framing.
- F. Section 092116 - Gypsum Board Assemblies: Gypsum-based sheathing.

## 1.3 DEFINITIONS

- A. General: See AISI S240 for definitions of terms used in this section.
- B. Connection: A combination of structural elements and joints used to transmit forces between two or more members.
- C. Connector: A device used to transmit forces between cold-formed steel structural members or between a cold-formed steel structural member and another structural element.

## 1.4 REFERENCE STANDARDS

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members 2016, with Supplement (2020).
- B. AISI S201 - North American Standard for Cold-Formed Steel Framing - Product Data 2017.
- C. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing 2015, with Errata (2020).
- D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.

- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- F. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings 2020.
- G. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members 2015.
- H. ASTM C1007 - Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories 2020.
- I. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing 2017.
- J. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

#### 1.5 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with work of other sections that is to be installed in or adjacent to metal framing systems, including but not limited to structural anchors, cladding anchors, utilities, insulation, and firestopping.
- B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by affected installers.

#### 1.6 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Provide data on cold-formed steel structural members; include material descriptions and base steel thickness.
- C. Product Data: Provide manufacturer's data on factory-made connectors and mechanical fasteners, showing compliance with requirements.
- D. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
  - 1. Indicate stud layout.
  - 2. Describe method for securing studs to tracks and for bolted framing connections.
- E. Installation Drawings: Indicate dimensioned locations of cold-formed steel structural framing.
  - 1. Include materials and dimensions.
- F. Manufacturer's Qualification statement.
- G. Testing Agency Qualification Statement.

## 1.7 QUALITY ASSURANCE

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Designer Qualifications: Design framing system under direct supervision of a professional structural engineer experienced in designing this work and licensed in the State in which the Project is located.
- C. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, and with minimum three years of experience.
- D. Manufacturer Qualifications: Member of Steel Stud Manufacturers Association (SSMA): [www.ssma.com/#sle](http://www.ssma.com/#sle).
- E. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience and approved by manufacturer.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Structural Framing:
  - 1. CEMCO: [www.cemcosteel.com/#sle](http://www.cemcosteel.com/#sle).
  - 2. ClarkDietrich: [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
  - 3. MarinoWARE: [www.marinoware.com/#sle](http://www.marinoware.com/#sle).
  - 4. Steel Construction Systems: [www.steelconsystems.com/#sle](http://www.steelconsystems.com/#sle).
  - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Connectors:
  - 1. Same manufacturer as metal framing.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Design Requirements: Design cold-formed framing systems, components and connectors to withstand specified design loads in compliance with ICC (IBC), ASCE 7, AISI S100, and AISI S240.

### 2.3 MATERIALS

- A. Material and Product Requirements Criteria: AISI S201.
- B. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.
  - 1. Structural Grade: As required to meet design criteria.

## 2.4 STRUCTURAL FRAMING COMPONENTS

- A. Wall Studs and Track Sections: AISI S240; c-shaped studs and u-shaped track sections in stud-matching nominal width and compatible height.
1. Structural Grade: ST50H.
  2. Corrosion Protection Coating Designation: CP 60 in accordance with AISI S240.
  3. Thickness and Depth: Depth as indicated on the drawings; thickness and structural grade as required to meet design criteria.
  4. Provide components fabricated from ASTM A1011/A1011M Designation SS (structural steel).
  5. Products:
    - a. MarinoWARE; StudRite: [www.marinoware.com/#sle](http://www.marinoware.com/#sle).
    - b. MBA Building Supplies; Structural Studs & Track: [www.mbastuds.com/#sle](http://www.mbastuds.com/#sle).
    - c. Super Stud Building Products, Inc; SuperMAXX Studs: [www.buysuperstud.com/#sle](http://www.buysuperstud.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
- B. Jamb Studs: AISI S240; manufactured, engineered, c-shaped with wide flanges, designed to replace conventional double-stud framing at openings.
1. Structural Grade: ST50H.
  2. Corrosion Protection Coating Designation: CP 60 in accordance with AISI S240.
  3. Thickness and Depth: Depth as indicated on drawings; thickness and structural grade as required to meet specified design criteria.
- C. Headers: AISI S240; manufactured, engineered two-member assemblies, with wide flanges, designed to replace conventional box or nested header framing at openings.
1. Structural Grade: ST50H.
  2. Corrosion Protection Coating Designation: CP 60 in accordance with AISI S240.
  3. Thickness: 43 mils, 0.0428 inch.
  4. Depth: 6 inches.
  5. Jamb Mounting Clips: Manufacturer's standard.

## 2.5 MISCELLANEOUS CONNECTIONS

- A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot-dip galvanized per ASTM A153/A153M.

- B. Anchorage Devices: Powder actuated.
- C. Welding: Comply with AWS D1.1/D1.1M.

## 2.6 SHEATHING

- A. Glass-mat-faced gypsum board; ASTM C1177/C1177M, square long edges, 5/8 inch thick, Type X - fire-resistant.
- B. Board Insulation Wall Sheathing: See Section 072100.

## 2.7 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Galvanizing Repair: Touch up bare steel with zinc-rich paint in compliance with ASTM A780/A780M.
- C. Air, Vapor, and Water Barrier: See Section 072700.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

### 3.2 INSTALLATION - GENERAL

- A. Install structural members and connections in compliance with ASTM C1007.

### 3.3 INSTALLATION OF STUDS

- A. Install wall studs plumb and level.
- B. Construct corners using minimum of three studs. Install double studs at wall openings, door and window jambs.
- C. Install load-bearing studs full length in one piece. Splicing of studs is not permitted.
- D. Install load-bearing studs; brace, and reinforce to develop full strength and achieve design requirements.
- E. Coordinate placement of insulation in multiple stud spaces made inaccessible after erection.
- F. Install intermediate studs above and below openings to align with wall stud spacing.



- G. Provide deflection allowance in stud track, directly below horizontal building framing at non-loadbearing framing.
- H. Attach cross studs to studs for attachment of fixtures anchored to walls.
- I. Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.
- J. Touch-up field welds and damaged corrosion-protected surfaces zinc-rich paint in compliance with ASTM A780/A780M.

### 3.4 INSTALLATION OF WALL SHEATHING

- A. Install wall sheathing with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using self-tapping screws.
  - 1. Provide steel diagonal bracing at corners with foam insulation or gypsum board wall sheathing.
  - 2. Place air, vapor, and water barrier in accordance with Section 072700.

### 3.5 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Provide material verification inspections in accordance with requirements of AISI S240.
- C. Provide inspections for mechanical fastening and cold-formed steel light-frame construction in accordance with requirements of AISI S240.

### 3.6 TOLERANCES

- A. Studs - Vertical Alignment (Plumbness):  $1/960$  of span or  $1/8$  inch in 10 ft, in accordance with ASTM C1007.
- B. Studs - Maximum Variation from True Position:  $1/8$  inch in accordance with ASTM C1007.
- C. Stud Spacing:  $1/8$  inch from the designated spacing, provided that the cumulative error does not exceed the requirements of the finishing materials in accordance with ASTM C1007.

END OF SECTION

SECTION 055000 - METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Shop fabricated steel items.
- B. Downspout boots.
- C. Bollards.

1.2 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.
- B. Section 099113 - Exterior Painting: Paint finish.

1.3 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- B. ASTM A48/A48M - Standard Specification for Gray Iron Castings 2022.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- F. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- G. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- H. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.
- I. SSPC-SP 2 - Hand Tool Cleaning 2018.

1.4 SUBMITTALS

- A. See Section 013300 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.

## PART 2 PRODUCTS

### 2.1 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- C. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- D. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- E. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- F. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

### 2.2 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.

### 2.3 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; galvanized finish.
- B. Lintels: As detailed; prime paint finish.
- C. Door Frames for Overhead Door Openings: Channel sections; prime paint finish.

## 2.4 DOWNSPOUT BOOTS

- A. Downspout Boots: Smooth interior without boxed corners or choke points; include integral lug slots and on-body cleanout and cover with neoprene gaskets.
  - 1. Configuration: 90 degree.
  - 2. Material: Cast iron; ASTM A48/A48M; casting thickness 3/8 inch (9.5 mm), minimum.
  - 3. Finish: Manufacturer's standard factory applied powder coat finish.
  - 4. Color: To be selected by Architect from manufacturer's full range.
  - 5. Accessories: Manufacturer's standard stainless steel fasteners, stainless steel building wall anchors, and rubber coupling.
  - 6. Manufacturers:
    - a. Downspoutboots.com, a division of J. R. Hoe & Sons: [www.downspoutboots.com/#sle](http://www.downspoutboots.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.

## 2.5 FINISHES - STEEL

- A. Prime paint steel items.
  - 1. Exceptions: Galvanize items to be embedded in concrete, items to be embedded in masonry, and items specified for painted finish.
  - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- 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 Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

## 2.6 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.

- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

#### 3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

#### 3.3 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 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 , except surfaces to be in contact with concrete.

#### 3.4 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

## SECTION 055213 - PIPE AND TUBE RAILINGS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Free-standing railings at steps.

## 1.2 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Placement of anchors in concrete.
- B. Section 042000 - Unit Masonry: Placement of anchors in masonry.
- C. Section 099113 - Exterior Painting: Paint finish.

## 1.3 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. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- C. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures 2006.
- D. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings 2020.
- E. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube 2022.
- F. ASTM B429/B429M - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube 2020.
- G. ASTM B483/B483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tube and Drawn Pipe for General Purpose Applications 2021.
- H. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings 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 (2022).

- L. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel 2017, with Amendment (2021).
- M. AWS C3.4M/C3.4 - Specification for Torch Brazing 2016.
- N. AWS C3.5M/C3.5 - Specification for Induction Brazing 2016, with Amendment (2017).
- O. AWS C3.9M/C3.9 - Specification for Resistance Brazing 2020.

#### 1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
  - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
  - 2. Include the design engineer's seal and signature on each sheet of shop drawings.
- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated within the previous 12 months.

#### 1.5 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 qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Handrails and Railings:
  - 1. Alumi-Guard: [www.alumi-guard.com/#sle](http://www.alumi-guard.com/#sle).
  - 2. Greco Aluminum Railings: [www.grecoailings.com/#sle](http://www.grecoailings.com/#sle).
  - 3. Superior Aluminum Products, Inc; Series 5H Pipe Railing: [www.superioraluminum.com/#sle](http://www.superioraluminum.com/#sle).
  - 4. The Wagner Companies: [www.wagnercompanies.com/#sle](http://www.wagnercompanies.com/#sle).

5. Substitutions: See Section 016000 - Product Requirements.

## 2.2 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 50 pounds per linear foot 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 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.
- F. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
  1. For anchorage to concrete, provide inserts to be cast into concrete, for bolting anchors.
  2. For anchorage to masonry, provide brackets to be embedded in masonry, for bolting anchors.
  3. Posts: Provide adjustable flanged brackets.
- G. 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.
- H. Welded and Brazed Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
  1. Ease exposed edges to a small uniform radius.
  2. Welded Joints:
    - a. Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.
    - b. Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.
  3. Brass/Bronze Brazed Joints:
    - a. Perform torch brazing in accordance with AWS C3.4M/C3.4.
    - b. Perform induction brazing in accordance with AWS C3.5M/C 3.5.



- c. Perform resistance brazing in accordance with AWS C3.9M/C3.9.

### 2.3 ALUMINUM MATERIALS

- A. Aluminum Pipe: Schedule 40; ASTM B429/B429M, ASTM B241/B241M, or ASTM B483/B483M.
- B. Welding Fittings: No exposed fasteners; cast aluminum.

### 2.4 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.
- E. Weld connections that cannot be shop welded due to size limitations.
  - 1. Weld in accordance with AWS D1.1/D1.1M.
  - 2. Match shop welding and bolting.
  - 3. Clean welds, bolted connections, and abraded areas.
  - 4. Touch up shop primer and factory-applied finishes.
  - 5. Repair galvanizing with galvanizing repair paint per ASTM A780/A780M.

### 2.5 ALUMINUM FINISHES

- A. Superior Performance Organic Coating System: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
- B. Color: To be selected by Architect from manufacturer's full line.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

#### 3.2 PREPARATION

- A. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.
- B. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

#### 3.3 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. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- D. Anchor railings securely to structure.
- E. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

#### 3.4 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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## SECTION 057300 - DECORATIVE METAL RAILINGS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Component Aluminum railings
  - 2. Infill system for component aluminum railings

## 1.3 PERFORMANCE REQUIREMENTS

- A. All railings shall be supplied to conform to applicable sections of the following codes:
  - 1. North Carolina Building Code
  - 2. ADAAG
- B. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails:
    - a. Uniform load of 50 lbf/ft. applied in any direction.
    - b. Concentrated load of 200 lbf. applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Top Rails of Guards:
    - a. Uniform load of 50 lbf/ft. applied in any direction.
    - b. Concentrated load of 200 lbf. applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 3. Infill Area of Guards:

- a. Horizontal concentrated load of 50 lbf. applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area. Load on infill area need not be assumed to act concurrently with loads on top rails.
- C. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120°F, ambient; 180°F, material surfaces.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

#### 1.4 SUBMITTALS

- A. Product Data: For the following:
  - 1. Manufacturer's product lines of mechanically connected railings.
  - 2. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer licensed in North Carolina responsible for their preparation.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design.
- D. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- E. Qualification Data: For professional engineer.
- F. Product Test Reports: Supplier shall submit calculations and test reports for complete system, including railing and infill panels. Calculations and test reports shall be stamped by a licensed PE. Test reports shall be in accordance with ASTM E 935.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing through one source from a single manufacturer.
- B. Mock-up Panel: one section of railing system for verification.
  - 1. Approximate Size: ¼ to ½ size using full size components.
  - 2. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents unless such deviations are specifically approved by architect in writing.

#### 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

#### 1.7 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Railings:
  1. Hollaender Manufacturing (Basis-of-Design); [www.hollaender.com/#sle](http://www.hollaender.com/#sle).
  2. Viva Railings; [www.vivarailings.com/#sle](http://www.vivarailings.com/#sle).
  3. Wagner Companies; [www.wagnercompanies.com/#sle](http://www.wagnercompanies.com/#sle).
  4. Substitutions: See Section 016000 – Product Requirements
- B. Connectors:
  1. Same manufacturers as railings.
- C. Infill Panels:
  1. Same manufacturers as railings.
  2. Banker Wire; [www.bankerwire.com/#sle](http://www.bankerwire.com/#sle).
- D. Basis-of-Design Railing Product: Subject to compliance with requirements, provide Interna-Rail® aluminum component railing as manufactured and assembled by Hollaender Manufacturing or an approved equivalent. Single source manufacturer is required. Welded railing will not be accepted.

## 2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

## 2.3 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
- B. Extruded Bars and Tubing: ASTM B 221, Alloy 6063-T5/T52, 6005-T5.
- C. Provide 1 ½ in IPS, (1.90 in OD) Standard Weight (Schedule 40) pipe for rails, Schedule 80 for posts, Schedule 10 for pickets, unless otherwise indicated.
- D. Extruded Structural Pipe and Round Tubing: ASTM B 429, Alloy 6061-T6.
- E. Provide 1 ½ in IPS, (1.90 in OD) Standard Weight (Schedule 40) pipe for rails, Schedule 80 for posts, unless otherwise indicated.
- F. Drawn Seamless Tubing: ASTM B 210, Alloy 6063-T832.
- G. Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- H. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.
- I. Base Flange Castings: ASTM B 26/B 26M, Alloy Almag 535.
- J. Panel Clips and Structural Fasteners: Alloy 6063-T6.

## 2.4 STEEL

- A. Perforated Sheet: ASTM A1008.

## 2.5 FASTENERS

- A. General: Provide the following:
  - 1. Aluminum Railings: Alloy steel fasteners with JS-600 zinc plating.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Structural Fasteners for Interconnecting Railing Components:

1. Rails shall be attached to posts by means of tee fittings equipped with anodized aluminum, tubular rivet nut and stainless steel socket head cap screw. All structural fasteners such as tee fittings shall be machined from 6063-T6 aluminum alloy. The fitting shall be internally connected to the rail by means of an internal dual tang that is expanded with a stainless steel, internal /external, reverse knurl, cup point socket head set screw. This combination shall prevent any loosening of the system due to changes in temperature or vibration. Systems using pop rivets or adhesives will not be accepted.
- D. Fasten infill panels to rails and posts with panel clips, machined from 6063-T6 aluminum alloy. Secure the infill panels in the panel clips with reverse-knurl cup-point set screws. Fasten panel clips to rails and posts with ¼ - 20 sheet metal screws, or as recommended by manufacturer.
- E. Anchors: Provide concrete adhesive anchors where indicated or necessary.

## 2.6 INFILL FOR RAILINGS

### A. Panel:

1. Welded Steel Wire Mesh infill panel: minimum .118 inch wire diameter pre-galvanized steel.
2. Pattern: 2" square.
3. Frame: steel U-channel, minimum 14 ga, corners welded and ground smooth. To assure minimum maintenance and maximum corrosion protection, bottom channel of frame shall be open, in order to evacuate all water.
4. Corrosion Protection
  - a. Entire panel to be electro-coated. Electro-coating to be PPG Power cron 8000 or equivalent, and shall cover all exposed surfaces, especially interior of U channel. Electro-coating to be applied in four steps: pre-treatment, electro-coat, post rinse and bake oven.
  - b. Entire panel shall then be powder coated from manufacturers full color line. Powder to be TGIC Polyester, minimum AAMA 2605.
5. Panels to be attached to railing using manufacturer standard panel retainers and ¼ - 20 screws, with appropriate slot width for panel thickness, and set screw for final tightening of panel within retainer slot.

## 2.7 HANDRAIL FOR ADA APPLICATIONS OR STAIRS (AS REQUIRED)

1. Ramps, elevated walks, and site walls that have a drop off of 30 inches or more on the side require guardrails, per above spec, and as indicated on drawings.
2. Ramps with a rise greater than 6 inches shall have handrails on both sides.
3. Stairways shall have handrails on both sides.
4. Handrail will be attached to the guardrail sections using adjustable brackets, and to walls using fixed brackets.



5. Handrail will be installed at a height of 34 – 38 inches above ramp surface or stair tread nosings measured to the top of gripping surface. Install at a consistent height throughout project.
6. Handrail will be anodized aluminum 6063 Sch. 40, 1 ½ in IPS nominal (1.90 in. OD) and shall have a continuous surface. Where necessary, lengths of the handrail will be spliced using internal locking splices.
7. Handrails shall return to a wall, guard or walking surface.

## 2.8 MISCELLANEOUS MATERIALS

- A. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.9 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with non-welded connections, unless otherwise indicated.
- H. Non-welded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
  1. Fittings to be of the internal double tang type activated by a reverse knurl cup point set screw. Reverse knurl is required to ensure that screw does not come loose under vibration. Plain cup point screws will not be accepted. Fittings to be fastened to pipe by means of a 5/16 in. tubular rivet nut and socket head cap screw.
- I. Form changes in direction as follows:
  1. By flush bends or by inserting prefabricated flush-elbow fittings.

- J. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- K. Close exposed ends of railing members with prefabricated end fittings.
- L. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns.
- M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated. Flanges to be sand cast from aluminum alloy 535 with anodized finish and fastened directly to the post by means of two reverse knurl cup point set screws.
- N. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

## 2.10 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

## 2.11 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Unless indicated otherwise, provide aluminum pipe with the following finish:
  - 1. Finish: Powder coat
    - a. Color: as selected by Architect from manufacturer's full line. Powder coat to be TGIC-Polyester, min. AAMA 2605.

## 2.12 STEEL FINISHES

- A. Wire Mesh Infill Panel:

1. Primer/Corrosion Protection – PPG Powercron 8000 or approved equal, applied in four-step process.
2. Finish: Powder coat
  - a. Color: as selected by Architect from manufacturer's full line. Powder coat to be TGIC-Polyester, min. AAMA 2605.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
  3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

#### 3.2 RAILING CONNECTIONS

- A. Non-welded Connections: Use mechanical joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to 1 side, and locate joint within 6 inches of post.

#### 3.3 ANCHORING RAILING ENDS

- A. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.

- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and connected to railing ends using non-welded connections.

#### 3.4 ATTACHING HANDRAILS TO WALLS

- A. Attach handrails to wall with wall brackets. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
- B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Secure wall brackets to building construction as indicated, or if not indicated, as follows:
  - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  - 2. For hollow masonry anchorage, use toggle bolts.
  - 3. Provide blocking between studs in stud wall construction.

#### 3.5 ADJUSTING AND CLEANING

- A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

#### 3.6 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

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## SECTION 057500 – DECORATIVE METAL PANELS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Prefabricated exterior metal panel assemblies, complete, including panels, supports, and hardware for stand-alone applications and railing infill panel applications.
  - 1. Slab anchorage.
  - 2. Railing panel anchorage.

## 1.2 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete.
- B. Section 051213 – Architectural-Exposed Structural Steel Framing.
- C. Section 057300 - Decorative Metal Railings.
- D. Section 099113 - Exterior Painting.

## 1.3 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. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- 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 2016a.
- E. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2017.
- F. ASTM A449 - Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use 2014 (Reapproved 2020).
- G. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip 2022a.
- H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.

- I. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2023.
- J. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings 2020.
- K. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process 2022.
- L. ASTM A879/A879M - Standard Specification for Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface 2022.
- M. 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.
- N. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- O. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- P. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.
- Q. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- R. ASTM D523 - Standard Test Method for Specular Gloss 2014 (Reapproved 2018).
- S. ASTM D2244 - Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates 2022.
- T. ASTM D4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films 2007 (Reapproved 2015).
- U. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements 2022.
- V. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs 2022.
- W. ASTM F594 - Standard Specification for Stainless Steel Nuts 2022.
- X. ASTM F1941/F1941M - Standard Specification for Electrodeposited Coatings on Mechanical Fasteners, Inch and Metric 2016.
- Y. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- Z. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel 2017, with Amendment (2021).
- AA. Consumer Product Safety Commission (CPSC) – Public Playground Safety Handbook
- BB. NAAMM AMP 500-06 - Metal Finishes Manual 2006.

- CC. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components 2023.
- DD. SSPC-PA 1 - Shop, Field, and Maintenance Coating of Metals 2016.
- EE. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- FF. SSPC-SP 5 - White Metal Blast Cleaning 2007.

#### 1.4 SUBMITTALS

- A. See Section 013300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, finish, and:
  - 1. Finish manufacturer's data sheet showing physical and performance characteristics.
  - 2. Storage and handling requirements and recommendations.
  - 3. Fabrication instructions and recommendations.
  - 4. Specimen warranty for finish, as specified herein.
- C. Shop Drawings: Engineered shop drawings by a licensed professional in the jurisdiction in which Project is located. For each type of panel show material, thickness, cutout pattern and penetrations, finish, size and spacing of fasteners, mounting clips, and accessories. Provide panel layout drawings indicating size, shape, pattern orientation, and method of support.
  - 1. Differentiate between shop and field fabrication.
  - 2. Indicate substrates and adjacent work with which the fabrications must be coordinated.
  - 3. Include large-scale details of anchorages and connecting elements.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
  - 1. Submit one sample for each pattern selected, not less than 6-inch x 6-inch showing pattern geometry and selected finish.
- E. Certificate: Certify that work results of this section meet or exceed specified requirements.
- F. Fabricator's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Maintenance Data: Care of finishes and warranty requirements.
- I. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.



## 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating 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 in this section.
- C. Professional Engineer Qualifications: Documented experience with providing delegated-design engineering services of the kind required by this Section, including documentation that engineer is licensed in the jurisdiction in which Project is located.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
  - 1. Protect finishes by applying heavy duty removable plastic film during production.
  - 2. Package for protection against transportation damage.
  - 3. Provide markings to identify components consistently with drawings.
  - 4. Exercise care in unloading, storing and installing panels to prevent bending, warping, twisting and surface damage.
- B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
  - 1. Store in well-ventilated space out of direct sunlight.
  - 2. Protect from moisture and condensation with tarpaulins or other suitable weathertight covering installed to provide ventilation.
  - 3. Store at a slope to ensure positive drainage of accumulated water.
  - 4. Do not store in enclosed space where ambient temperature can exceed 120 degrees F.
  - 5. Avoid contact with other materials that might cause staining, denting, or other surface damage.

## 1.7 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Finish Warranty: Provide 10-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.
- C. Manufacturer Warranty: Provide panel manufacturer's limited warranty against defect in material and workmanship.

## PART 2 PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

1. Delegated Design: Design structure to withstand applicable design loads.
2. Structural Requirements: Engineer panel assemblies and supports to withstand design loads.
3. Thermal Movement: Allow for 180 deg. F thermal variation.
4. Panels shall comply with CPSC requirements with regards to entanglement; impalement; entrapment; and sharp points, corners, and edges.

### 2.2 MANUFACTURERS

#### A. Decorative Metal Panels Manufacturers:

1. Artisan Panels Inc. (Basis-of-Design): [www.artisanpanels.com/#sle](http://www.artisanpanels.com/#sle).
2. Parasoleil: [www.parasoleil.com/#sle](http://www.parasoleil.com/#sle).
3. Revamp Panels, LLC: [www.revamppanels.com/#sle](http://www.revamppanels.com/#sle).

### 2.3 DECORATIVE METAL PANELS - GENERAL

- A. Shop Assembly: Preassemble items to greatest extent possible. Minimize field splices and field assembly. Disassemble only as necessary for transportation and handling. Mark items clearly for assembly and installation.
- B. Coordination: Match dimensions and attachment of metal panels to adjacent construction. Produce integrated assemblies. Closely fit joints; align edges and flat surfaces unless indicated otherwise.
- C. System Engineering: Provide complete engineered systems including panels and panel-mounting hardware for screen and railing applications as indicated on drawings.
- D. Supports: Miscellaneous framing, mounting, clips, sleeves, fasteners and accessories required for installation.
- E. Welding and Brazing: Weld or braze joints continuously. Grind, fill or dress to produce smooth, flush, exposed surfaces. Do not discolor metal. Grind smooth, polish, and restore damaged finishes to required condition.
  1. Ease exposed edges to small uniform radius.
  2. Welded Joints:
    - a. Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.
    - b. Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.

## F. Performance Requirements:

## 1. Thermal Movements:

- a. Allow for thermal movements in exterior metal fabrications due to temperature changes. Prevent buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
- b. Temperature Change Range: 120 degrees F, ambient; 180 degrees F, on material surfaces.

2. Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

## 2.4 METAL PANEL FABRICATION

## A. Provide manufacturer's standard laser-cut architectural panels.

1. Panel Thickness: As required to meet code requirements and manufacturer recommended thickness per material and pattern, 1/8" minimum.
2. Patterns: As selected by Architect from manufacturer's full pattern range, adjusted to fit size and shape of panels as indicated on drawings.
3. Cutting and Cutouts: Cut metal with laser cutter capable of 1/16-inch tolerance. Remove burrs in accordance with WBTD recommended "Deburring & Edge Finishing Handbook" by LaRoux K. Gillespie, Level D, without magnification.
4. Pre-drill holes for fasteners in factory to the extent practical.
5. Panel cutouts and fastener holes shall be completed prior to finish being applied.
6. Color: To be selected by Architect from manufacturer's full color range.

- B. Mounting system: Welded or bolt-on angle tabs for locations mounting to steel tube posts. Bolt-on straight tabs for railing infill panel locations. Coordinate mounting requirements and railing design loads with railing manufacturer prior to submitting for review.

## 2.5 MATERIALS

- A. General: Provide metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections exposed to view on finished units.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Aluminum Sheet: ASTM B209/B209M, 5005-H32 minimum; alloy and temper recommended by aluminum producer and finisher for use and finish indicated.
- D. Galvanized Steel Sheet: ASTM A653/A653M, G90 (Z275) coating.

- E. Steel Sheet: ASTM A1008/A1008M uncoated, cold rolled, Type CS (commercial steel), exposed or ASTM A879/A879M electrolytic zinc coating over ASTM A1008/A1008M steel sheet substrate.
- F. Anchors, Clips and Accessories: Use one of the following:
  - 1. Stainless steel complying with ASTM A276/A276M, ASTM A480/A480M, or ASTM A666.
  - 2. Steel complying with ASTM A36/A36M and hot-dipped galvanized to ASTM A153/A153M.
  - 3. Exterior Locations or in Contact with Stainless Steel:
    - a. Bolts: Stainless steel; ASTM F593, Group 1 (A1).
    - b. Nuts: Stainless steel; ASTM F594.
  - 4. Structural Anchors: Provide anchors where work is indicated to comply with design loads.
    - a. Type: Provide chemical or torque-controlled expansion anchors.
    - b. Capacity: When tested according to ASTM E488/E488M; four times the load imposed when installed in concrete.
  - 5. Nonstructural Anchors: Provide powder-actuated fasteners where work is not indicated to comply with design loads. Provide size and number required for load, installation, and as recommended by manufacturer, unless indicated otherwise.
- G. Fasteners, General: Same basic metal and alloy as formed metal sheet unless indicated otherwise. Do not use metals incompatible with the materials joined. Size and spacing as shown on approved shop drawings.
- H. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 15 mil dry film thickness per coat.

## 2.6 FINISHES

- A. Finishes, General: Comply with NAAMM AMP 500-06.
  - 1. Complete mechanical finishes before fabrication. After fabrication, finish joints, bends, abrasions and surface blemishes to match sheet.
  - 2. Protect mechanical finishes on exposed surfaces from damage.
  - 3. Apply organic and anodic finishes to metal after fabrication unless otherwise indicated.
  - 4. Appearance: Limit variations in appearance of adjacent pieces to one-half of range represented in approved samples. Noticeable variations in same piece are not acceptable. Install components within range of approved samples to minimize contrast.
- B. Aluminum Finishes:

1. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
  2. Color: To be selected by Architect from manufacturer's full range.
  3. Touch-Up Materials: As recommended by coating manufacturer for field application.
- C. Galvanized Steel Finishes:
1. Repair Galvanized Surfaces: Clean welds and abraded areas and repair galvanizing to comply with ASTM A780/A780M.
  2. Factory Prime: Apply shop primer to prepared surfaces of items where field painting after installation indicated, unless indicated otherwise. Comply with requirements in SSPC-PA 1.
  3. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.
- D. Steel Finishes:
1. Surface Preparation: Comply with SSPC-SP 1; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust from uncoated steel; comply with SSPC-SP 5.
  2. Pretreatment: Immediately after cleaning, apply a conversion coating of type suited to organic coating applied over it.
  3. Factory Prime: Apply shop primer to prepared surfaces of items where field painting after installation indicated, unless indicated otherwise.
  4. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify dimensions, tolerances, and interfaces with other work.
- B. Verify substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturer's written instructions.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Notify Architect in writing of conditions detrimental to proper and timely completion of work. Do not proceed with erection until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Protect adjacent work areas and finish surfaces from damage during installation.
- B. Deliver anchorage items to be cast into concrete or built into masonry to appropriate installer(s) together with setting templates.
- C. Coat concrete and masonry surfaces that will be in contact with metal surfaces with bituminous coating.

### 3.3 INSTALLATION

- A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.
- B. Comply with instructions and recommendations of MCM sheet manufacturer and fabricator, and with approved shop drawings.
- C. Install securely allowing for necessary thermal and structural movement; comply with fabricator's instructions for installation of concealed fasteners.
- D. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.
- E. Do not cut or abrade metal finishes that cannot be completely restored in the field. Return such items to manufacturer or fabricator for required alterations and refinishing or provide new items.
- F. Corrosion Protection: Apply permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with incompatible substrate materials. Prevent corrosion damage to material and finish.
- G. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
  - 1. Variation From Plane or Location: 1/8 inch in 10 feet of length or height, maximum.
  - 2. Deviation of Vertical or Horizontal Member From True Line: 1/8 inch in 10 feet run, maximum.
  - 3. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 1/32 inch, maximum.
- H. Replace damaged products.
  - 1. Exception: Field repairs of minor damage to finishes are permitted only when approved in writing by Architect, panel manufacturer, and fabricator.
  - 2. Field Repairs to Finishes: Using materials and methods sufficient that repairs are not discernible when viewed at distance of 5 feet under typical light conditions experienced at project.

3.4 CLEANING

- A. Restore finishes damaged during installation and construction period. Return items that cannot be refinished in the field to manufacturer or fabricator. Refinish entire unit or provide new units.
- B. Remove temporary coverings and protection of adjacent work areas.
- C. Clean installed products in accordance with manufacturer's instructions.

3.5 PROTECTION

- A. Protect installed products from damage during construction.

END OF SECTION

## SECTION 061000 - ROUGH CARPENTRY

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Roofing nailers.
- B. Preservative treated wood materials.
- C. Miscellaneous framing and sheathing.
- D. Communications and electrical room mounting boards.
- E. Concealed wood blocking, nailers, and supports.
- F. Miscellaneous wood nailers, furring, and grounds.

## 1.2 RELATED REQUIREMENTS

- A. Section 072700 - Air Barriers: Air barrier over sheathing.
- B. Section 092116 - Gypsum Board Assemblies: Gypsum-based sheathing.

## 1.3 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings 2018, with Errata (2019).
- C. AWPA U1 - Use Category System: User Specification for Treated Wood 2022.
- D. PS 20 - American Softwood Lumber Standard 2021.
- E. SPIB (GR) - Standard Grading Rules 2021.

## 1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials and application instructions.
- C. Structural Composite Lumber: Submit manufacturer's published structural data including span tables, marked to indicate which sizes and grades are being used; if structural composite lumber is being



substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.

- D. Samples: For rough carpentry members that will be exposed to view, submit two samples, in size illustrating wood grain, color, and general appearance.
- E. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

## 1.5 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 PRODUCTS

### 2.1 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. 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.
  - 2. 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.
  - 3. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

### 2.2 EXPOSED DIMENSION LUMBER

- A. Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.
- B. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- C. Sizes: Nominal sizes as indicated on drawings.
- D. Surfacing: S4S.
- E. Moisture Content: S-dry or MC19.
- F. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16 ):
  - 1. Species: Southern Pine.

2. Grade: No. 2.

### 2.3 STRUCTURAL COMPOSITE LUMBER

- A. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.
  1. Beams: Use laminated veneer lumber, laminated strand lumber, or parallel strand lumber with manufacturer's published modulus of elasticity, E: 1,800,000 psi, minimum.

### 2.4 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.

### 2.5 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
  1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.
- B. Preservative Treatment:
  1. Products:
    - a. Lonza Group: [www.wolmanizedwood.com/#sle](http://www.wolmanizedwood.com/#sle).
    - b. Koppers Performance Chemicals, Inc: [www.koppersperformancechemicals.com/#sle](http://www.koppersperformancechemicals.com/#sle).
    - c. Viance, LLC: [www.treatedwood.com/#sle](http://www.treatedwood.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
  2. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
    - a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.

## PART 3 EXECUTION

### 3.1 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.

### 3.2 FRAMING INSTALLATION

- A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
- B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
- C. Install structural members full length without splices unless otherwise specifically detailed.
- D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWC (WFCM) Wood Frame Construction Manual.
- E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.
- F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
- G. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

### 3.3 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. Provide the following specific nonstructural framing and blocking:
  - 1. Cabinets and shelf supports.
  - 2. Grab bars.
  - 3. Towel and bath accessories.

3.4 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

END OF SECTION

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SECTION 061500 - WOOD DECKING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glued laminated structural wood decking.
- B. Preservative treatment of wood.

1.2 REFERENCE STANDARDS

- A. AITC 109 - Standard for Preservative Treatment of Structural Glued Laminated Timber 2007.
- B. AITC 110 - Standard Appearance Grades for Structural Glued Laminated Timber 2001.
- C. AITC 111 - Recommended Practice for Protection of Structural Glued Laminated Timber During Transit, Storage and Erection 2005.
- D. AITC 113 - Standard for Dimensions of Structural Glued Laminated Timber 2010.
- E. AITC A190.1 - American National Standard for Wood Products - Structural Glued Laminated Timber 2007.
- F. ASTM D2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions 2012a (Reapproved 2018).

1.3 SYSTEM DESCRIPTION

- A. Design roof live load: 20 psf with deflection limited to 1/240 of span.

1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials.
- C. Shop Drawings: Indicate deck framing system, loads and cambers, bearing details, and framed openings.
  - 1. Include the design engineer's seal and signature on each sheet of shop drawings.
- D. Manufacturer's Qualification Statement.
- E. Installer's Qualification Statement.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least three years of documented experience and certified by AITC.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with at least three years of documented experience.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect glue laminated members in accordance with AITC 111 requirements for unwrapped material.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Glued Laminated Decking:
  - 1. Katera: [www.katera.com](http://www.katera.com).
  - 2. Substitutions: See Section 016000 - Product Requirements.

### 2.2 WOOD MATERIALS

- A. Wood fabricated from old growth timber is not permitted.
- B. Provide sustainably harvested wood; see Section 016000 - Product Requirements for requirements.
- C. Marking: Mark each piece with producer's stamp indicating compliance with specified requirements; for pieces exposed to view in completed construction, submit manufacturer's certificate certifying that products comply with specified requirements in lieu of grade stamping.
- D. Glued Cross Laminated Timber Decking: Softwood lumber of any species fabricated to comply with AITC A190.1 and AITC 113, laminated with adhesive tested according to ASTM D2559 for wet service; beveled edges, single tongue.
  - 1. Appearance: Fabricate to AITC 110 Architectural grade.
  - 2. Designed for the following minimum values:
    - a. Bending (Fb): 875 psi.
    - b. Tension Parallel to Grain (Ft): 450 psi.
    - c. Compression Parallel to Grain (Fc): 1150 psi.
    - d. Horizontal Shear (Fv): 135 psi.

e. Modulus of Elasticity (E): 1,400,000 psi.

3. After end trimming, seal with penetrating sealer.

## 2.3 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.

## 2.4 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 Glued Laminated Decking: AITC 109 using waterborne preservative to 0.25 lb/cu ft retention.

a. Kiln dry lumber after treatment and before lamination to maximum moisture content of 19 percent.

C. Surface-Applied Wood Preservative:

## PART 3 EXECUTION

### 3.1 EXAMINATION

A. Verify that support framing is ready to receive decking.

### 3.2 PREPARATION

A. Coordinate placement of bearing items.

### 3.3 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment in accordance with manufacturer's instructions.

B. Brush apply one coats of preservative treatment on wood in contact with cementitious materials. Treat site-sawn cuts.

C. Allow preservative to dry prior to erecting members.



3.4 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. Engage decking tongue and groove edges.
- C. Secure with manufacturer's proprietary fastener system.

3.5 TOLERANCES

- A. Surface Flatness of Decking Without Load: 1/4 inch in 10 feet maximum, and 1/2 inch in 30 feet maximum.

END OF SECTION

SECTION 062000 - FINISH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Finish carpentry items.
- B. Hardware and attachment accessories.

1.2 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 099123 - Interior Painting: Painting of finish carpentry items.

1.3 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- D. AWPA U1 - Use Category System: User Specification for Treated Wood 2022.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data:
  - 1. Provide data on fire retardant treatment materials and application instructions.
- C. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

1.5 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

### 2.1 FINISH CARPENTRY ITEMS

- A. Quality Standard: Custom 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.
- C. Interior Woodwork Items:
  - 1. Moldings, Bases, Casings, and Miscellaneous Trim: Clear white pine; prepare for paint finish.

### 2.2 LUMBER MATERIALS

- A. Softwood Lumber: Southern Yellow Pine species, smooth sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
  - 1. Grading: In accordance with rules certified by ALSC; [www.alsc.org](http://www.alsc.org).

### 2.3 ACCESSORIES

- A. Lumber for Shimming and Blocking: Softwood lumber of Southern Yellow Pine species.
- B. Primer: Alkyd primer sealer.
- C. Wood Filler: Solvent base, tinted to match surface finish color.

### 2.4 WOOD TREATMENT

- A. Factory-Treated Lumber: Comply with requirements of AWPA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.
- B. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84.
- C. Wood Preservative by Pressure Treatment (PT Type): Provide AWPA U1 treatment using waterborne preservative with 0.25 percent retainage.
- D. Provide identification on fire retardant treated material.
- E. Redry wood after pressure treatment to maximum 14 percent moisture content.

## 2.5 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.

## PART 3 EXECUTION

### 3.1 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.

### 3.2 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. Do not use additional overlay trim to conceal larger gaps.
- D. Install components with nails or masonry anchors at 12 inches on center..

### 3.3 PREPARATION FOR SITE FINISHING

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
- B. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

### 3.4 TOLERANCES

- A. Maximum Variation from True Position: 1/16 inch.
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION

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## SECTION 072100 - THERMAL INSULATION

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Board insulation at cavity wall construction, perimeter foundation wall, over roof deck, and exterior wall behind fiber cement panel wall finish.
- B. Batt insulation and vapor retarder in exterior wall and roof construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

## 1.2 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Installation requirements for board insulation over steep slope roof sheathing or roof structure.
- B. Section 072700 - Air Barriers: Separate air barrier materials.

## 1.3 DEFINITIONS

- A. Mineral Fiber Material Composition: Insulation referred to as mineral fiber block, board, and blanket insulation is composed of fibers from mineral based substances such as rock, slag, or glass and processed from the molten state into fibrous form.
  - 1. Based on type of insulation substance, the material will be referred to as a mineral fiber when having a rock or slag base, and glass fiber with a glass or silica sand base, also considered a mineral.
  - 2. Insulation blankets are flexible units consisting of felted, bonded, or unbonded fibers formed into rolls or flat cut pieces referred to as batts; rolls are simply longer versions of batts.
  - 3. For additional information about mineral fiber and the various classification types, refer to the following reference standards; ASTM C553, ASTM C612, ASTM C665, and ASTM C726.

## 1.4 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 2022.
- B. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.

- C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).
- D. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.
- E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation 2014 (Reapproved 2019).
- F. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- G. ASTM C726 - Standard Specification for Mineral Wool Roof Insulation Board 2017.
- H. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2022a.
- I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- K. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C 2022.
- L. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components 2023.

## 1.5 SUBMITTALS

- A. See Section 013300 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.

## 1.6 FIELD CONDITIONS

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

## PART 2 PRODUCTS

### 2.1 APPLICATIONS

- A. Insulation Inside Masonry Cavity Walls: Extruded polystyrene (XPS) board.

- B. Insulation Over Metal Stud Framed Walls, Continuous: Mineral fiber board.
- C. Insulation on outside of Masonry Exterior Walls, behind rainscreen: Mineral fiber board.
- D. Insulation in Metal Framed Walls: Batt insulation with no vapor retarder.
- E. Insulation Over Roof Deck: Polyisocyanurate board.

## 2.2 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
  - 1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
  - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
  - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
  - 4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
  - 5. Board Edges: Square.
  - 6. Board Thickness: 2-1/2 inch.
  - 7. Type and Water Absorption: Type XII, 0.3 percent by volume, maximum, by total immersion.
  - 8. Products:
    - a. DuPont de Nemours, Inc; Styrofoam Brand Cavitymate Plus: [building.dupont.com/#sle](http://building.dupont.com/#sle).
    - b. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi: [www.kingspan.com/#sle](http://www.kingspan.com/#sle).
    - c. Owens Corning Corporation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
- B. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, comply with ASTM C1289.
  - 1. Classifications:
    - a. Type II: Faced with either cellulosic facers or glass fiber mat facers on both major surfaces of the core foam.
      - 1) Class 1 - Faced with glass fiber reinforced cellulosic facers on both major surfaces of core foam.
      - 2) Compressive Strength: Classes 1-2-3, Grade 3 - 25 psi (172 kPa), minimum.



- 3) Thermal Resistance, R-value: At 1-1/2 inch thick; Class 1, Grades 1-2-3 - 8.4 (1.48), minimum, at 75 degrees F.
2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Water Vapor Permeance: 1.2 perm, maximum, at 1 inch thickness, and when tested in accordance with ASTM E96/E96M, desiccant method.
5. Board Size: 48 inch by 96 inch.
6. Board Thickness: As recommended by insulation manufacturer to meet total thickness indicated on drawings.
7. Board Edges: Square.
8. Products:
  - a. Atlas Roofing Corporation; ACFoam Supreme Foil Faced Roof Insulation: [www.atlasroofing.com/#sle](http://www.atlasroofing.com/#sle).
  - b. Carlisle Coatings & Waterproofing, Inc; R2+ Matte: [www.carlisleccw.com/#sle](http://www.carlisleccw.com/#sle).
  - c. DuPont de Nemours, Inc; Thermax Brand: [building.dupont.com/#sle](http://building.dupont.com/#sle).
  - d. Substitutions: See Section 016000 - Product Requirements.

### 2.3 MINERAL FIBER BOARD INSULATION MATERIALS

#### A. Mineral Wool Block and Board Thermal Insulation: Complying with ASTM C612.

1. Facing: None, unfaced.
2. Flame Spread Index: 25 or less, when tested with facing, if any, in accordance with ASTM E84.
3. Smoke Developed Index: 50 or less, when tested with facing, if any, in accordance with ASTM E84.
4. Board Thickness: 2.5 inches.
5. Thermal Conductivity (k-factor): Btu inch/hr sq ft degrees F of 0.26 per inch, minimum, at 75 degrees F when tested in accordance with ASTM C518.
6. Thermal Resistance: R-value of 4.0 per inch at 75 degrees F, minimum, when tested in accordance with ASTM C518.
7. Maximum Density: 11 pcf, nominal.
8. Products:

- a. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
- b. Johns Manville: [www.jm.com/#sle](http://www.jm.com/#sle).
- c. Owens Corning Corporation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
- d. ROCKWOOL; COMFORTBOARD 110: [www.rockwool.com/#sle](http://www.rockwool.com/#sle).
- e. Substitutions: See Section 016000 - Product Requirements.

## 2.4 MINERAL FIBER BLANKET INSULATION MATERIALS

### A. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.

1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
4. Formaldehyde Content: Zero.
5. Products:
  - a. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - b. Johns Manville: [www.jm.com/#sle](http://www.jm.com/#sle).
  - c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
  - d. Substitutions: See Section 016000 - Product Requirements.

### 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. Products:
  - a. Johns Manville; MinWool Sound Attenuation Fire Batts: [www.jm.com/#sle](http://www.jm.com/#sle).
  - b. Knauf Insulation; EcoBatt Insulation: [www.knaufinsulation.com/#sle](http://www.knaufinsulation.com/#sle).
  - c. ROCKWOOL; COMFORTBATT: [www.rockwool.com/#sle](http://www.rockwool.com/#sle).
  - d. Thermafiber, Inc; SAFB: [www.thermafiber.com/#sle](http://www.thermafiber.com/#sle).

- e. Substitutions: See Section 016000 - Product Requirements.

## 2.5 ACCESSORIES

- A. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.
  - 1. Width: 3-1/2 inches.
  - 2. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 30 days of weather exposure.
- B. Tape: Polyethylene self-adhering type, mesh reinforced, 2 inch wide.
  - 1. Products:
- C. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.
- D. Air and Moisture Sealing Insulation Fasteners: Preassembled fastener units consisting of sealing washer, screw, and gasketing tube.
  - 1. Length as required for thickness of insulation material and penetration of deck substrate.
  - 2. Thread and tip types as required for substrate material.
- E. Mineral Wool Insulation Attachment:
- F. Rigid Insulation Pronged Attachment Washers: Solid plastic cap washer with prongs and flexible perimeter seal attached with screws to substrate for attachment of rigid insulation and to help seal against air and moisture penetration through weather barrier assembly.
- G. Insulation Fasteners: Appropriate for purpose intended.
  - 1. Length as required for thickness of insulation material and penetration of deck substrate.
- H. Adhesive: Type recommended by insulation manufacturer for application.

## PART 3 EXECUTION

### 3.1 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.

### 3.2 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. Extend boards over expansion joints, unbonded to wall on one side of joint.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- D. Tape insulation board joints.

### 3.3 BOARD INSTALLATION AT CAVITY WALLS

- A. Secure impale fasteners to substrate at following frequency:
  - 1. Eight (8) per insulation board.
- B. Install boards to fit snugly between wall ties.
- C. Install boards horizontally on walls.
  - 1. Install in running bond pattern.
  - 2. Butt edges and ends tightly to adjacent boards and protrusions.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

### 3.4 BOARD INSTALLATION USING CLADDING AND CONTINUOUS INSULATION SUPPORTS

- A. Install supports in accordance with manufacturer's installation instructions.
- B. Install supports in compliance with system orientation, sizes, and locations as indicated on drawings and in accordance with approved shop drawings.
- C. Install supports to fill in exterior wall spaces without gaps or voids in insulation.
- D. Trim insulation neatly to fit spaces and provide a continuous thermal layer.

### 3.5 BOARD INSTALLATION OVER LOW SLOPE ROOF DECK

- A. Board Installation Over Roof Deck, General:
  - 1. See applicable roofing specification section for specific board installation requirements.
  - 2. Ensure vapor retarder is clean and dry, continuous, and ready for application of roofing system.

3. Fasten insulation to deck in accordance with roofing manufacturer's written instructions.
4. Do not apply more insulation than can be covered with roofing on the same day.

### 3.6 BATT INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. Retain insulation batts in place with spindle fasteners at 12 inches on center.
- F. Coordinate work of this section with construction of air barrier seal, see Section 072700.

### 3.7 PROTECTION

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

END OF SECTION

## SECTION 072123 - LOOSE-FILL INSULATION

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Loose-fill insulation in cells of concrete masonry unit (CMU) walls.

## 1.2 RELATED REQUIREMENTS

- A. Section 042000 - Unit Masonry: Masonry wall system to receive loose-fill insulation.

## 1.3 REFERENCE STANDARDS

- A. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. ASTM C516 - Standard Specification for Vermiculite Loose Fill Thermal Insulation 2019.
- C. ASTM C549 - Standard Specification for Perlite Loose Fill Insulation 2018.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.

## 1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Installation Instructions: Indicate procedures for preparation and installation.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of experience.
  - 1. Perlite manufacturer is a member of Perlite Institute: [www.perlite.org/#sle](http://www.perlite.org/#sle).
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Vermiculite Loose-Fill Insulation:
  - 1. Schundler Company: [www.schundler.com/#sle](http://www.schundler.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Perlite Loose-Fill Insulation:
  - 1. Schundler Company[<>]: [www.schundler.com/#sle](http://www.schundler.com/#sle).
  - 2. Supreme Perlite Company[<>]: [www.perlite.com/#sle](http://www.perlite.com/#sle).
  - 3. Substitutions: See Section 016000 - Product Requirements.

### 2.2 MATERIALS

- A. Vermiculite Loose-Fill Insulation: ASTM C516, vermiculite type, water repellent, fire resistant; flame spread/smoke developed index of 0/0, when tested in accordance with ASTM E84.
- B. Perlite Loose-Fill Insulation: ASTM C549, perlite type, water repellent, fire resistant; flame spread/smoke developed index of 0/0, when tested in accordance with ASTM E84.
- C. Thermal Resistance [R-value]: Provided minimum values in accordance with applicable edition of ASHRAE Std 90.1 I-P for envelope requirements of building location and climate zone.

### 2.3 APPLICATIONS

- A. Provide loose-fill insulation in the following application(s) as indicated on drawings:
  - 1. Unit masonry wall system, refer to Section 042000 for additional information.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that substrate and adjacent materials are dry and ready to receive insulation.
- B. Verify wall spaces are free of mortar blockage allowing for free flow of insulation.

### 3.2 PREPARATION

- A. Verify holes and openings have been sealed to prevent escape of insulation.

3.3 INSTALLATION

- A. Install loose-fill insulation in accordance with manufacturer's instructions.
- B. Deposit loose-fill insulation as wall is erected and completely fill spaces.

3.4 PROTECTION

- A. Place temporary signs warning workers in areas that contain loose-fill insulated walls to use caution and to prevent loss of insulation when cutting into walls.

END OF SECTION



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## SECTION 072700 - AIR BARRIERS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Air barriers.

## 1.2 RELATED REQUIREMENTS

- A. Section 092116 - Gypsum Board Assemblies: Air barrier under exterior cladding.

## 1.3 DEFINITIONS

- A. Air Barrier: Airtight barrier made of material that is virtually air impermeable but water vapor permeable, both to amount as specified, with sealed seams and sealed joints to adjacent surfaces.

## 1.4 REFERENCE STANDARDS

- A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2021.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- C. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- D. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials 2021a.
- E. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials 2017.
- F. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components 2023.

## 1.5 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Provide data on material characteristics and performance criteria.
- 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.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience.
- B. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.

#### 1.7 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

### PART 2 PRODUCTS

#### 2.1 AIR BARRIER MATERIALS (AIR IMPERMEABLE AND WATER VAPOR IMPERMEABLE)

- A. Air and Vapor Barrier, Fluid-Applied:
  - 1. Material: Synthetic acrylic coating.
  - 2. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
  - 3. Water Vapor Permeance: 0.1 perm, maximum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F.
  - 4. Water Penetration Resistance Around Nails: Pass, when tested in accordance with ASTM D1970/D1970M.
  - 5. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 60 days of weather exposure.
  - 6. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
  - 7. Complies with NFPA 285 requirements for wall assembly.
  - 8. Products:
    - a. Carlisle Coatings and Waterproofing, Inc; Fire Resist Barritech  
NP: [www.carlisleccw.com/#sle](http://www.carlisleccw.com/#sle).
    - b. GCP Applied Technologies; Perm-A-Barrier NPL 10: [www.gcpat.com/#sle](http://www.gcpat.com/#sle).

- c. NaturaSeal; Air Barrier NS-A250-LP: [www.naturaseal.com/#sle](http://www.naturaseal.com/#sle).
- d. Tremco Commercial Sealants & Waterproofing; ExoAir 130: [www.tremcosealants.com/#sle](http://www.tremcosealants.com/#sle).
- e. Substitutions: See Section 016000 - Product Requirements.

## 2.2 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Air Barrier and Adjacent Substrates: As indicated or in compliance with air barrier manufacturer's installation instructions.
- B. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrate and air barrier materials.
  - 1. Application: Apply at 30 to 40 mil, 0.030 to 0.040 inch, nominal thickness.
  - 2. Color: Green.
  - 3. Comply with NFPA 285 requirements for wall assembly.
  - 4. Products:
    - a. Karnak Corporation; 323 K-NRG Gap Seal FR: [www.karnakcorp.com/#sle](http://www.karnakcorp.com/#sle).
    - b. Rubber Polymer Company; Rub-R-Wall Mastic: [www.rpcinfo.com/#sle](http://www.rpcinfo.com/#sle).
    - c. Substitutions: See Section 016000 - Product Requirements.
- C. Primer: Liquid applied polymer.
  - 1. Color: Green.
  - 2. Products:
    - a. Rubber Polymer Company; Rub-R-Wall SA Primer: [www.rpcinfo.com/#sle](http://www.rpcinfo.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
- D. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement waived if not installed on roof.
  - 1. Width: 4 inches.
  - 2. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 180 days of weather exposure.
  - 3. Products:
    - a. DuPont de Nemours, Inc; DuPont FlexWrap: [www.dupont.com/building/#sle](http://www.dupont.com/building/#sle).

- b. Henry Company; FortiFlash: [www.henry.com/#sle](http://www.henry.com/#sle).
  - c. Substitutions: See Section 016000 - Product Requirements.
- E. Flexible Flashing: Self-adhering or mechanically-attached flashing used for wall penetrations in accordance with ICC-ES AC148 requirements.
- F. Liquid Flashing: One part, fast curing, nonsag, gun grade, trowelable.
- 1. Products:
    - a. Dow; DOWSIL 778 Silicone Liquid Flashing: [www.dow.com/en-us/#sle](http://www.dow.com/en-us/#sle).
    - b. Momentive Performance Materials, Inc/GE Silicones; Elemax 5000 Liquid-Applied Flashing: [www.siliconeforbuilding.com/#sle](http://www.siliconeforbuilding.com/#sle).
    - c. Parex USA, Inc; Parex USA WeatherTECH with WeatherFlash: [www.parexusa.com/#sle](http://www.parexusa.com/#sle).
    - d. Polyglass USA, Inc; PolyFlash 1C - One Part Flashing Compound: [www.polyglass.us/#sle](http://www.polyglass.us/#sle).
    - e. Substitutions: See Section 016000 - Product Requirements.
- G. Thinners and Cleaners: As recommended by material manufacturer.
- H. Air and Moisture Sealing Insulation Fasteners: Preassembled fastener units consisting of sealing washer, screw, and gasketing tube.
- 1. Length as required for thickness of insulation material and penetration of deck substrate.
  - 2. Thread and tip types as required for substrate material.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that surfaces and conditions are ready for work of this section.
- B. Where existing conditions are responsibility of another installer, notify Architect of unsatisfactory conditions.
- C. Do not proceed with this work until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

- B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

### 3.3 INSTALLATION

- A. Install materials in accordance with manufacturer's installation instructions.
- B. Air Barriers: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.
- D. Self-Adhered Sheets:
  - 1. Prepare substrate in accordance with sheet manufacturer's installation instructions; fill and tape joints in substrate and between dissimilar materials.
  - 2. Lap sheets shingle fashion to shed water and seal laps airtight.
  - 3. Once sheets are in place, press firmly into substrate with resilient hand roller; ensure that laps are firmly adhered with no gaps or fishmouths.
  - 4. Use same material, or other material approved by sheet manufacturer, to seal to adjacent substrates, and as flashing.
  - 5. At wide joints, provide extra flexible membrane allowing joint movement.
- E. Fluid-Applied Coatings or Membranes:
  - 1. Prepare substrate in accordance with manufacturer's installation instructions; treat joints in substrate and between dissimilar materials as indicated.
  - 2. Where exterior masonry veneer is being installed, install masonry anchors before installing air barrier over masonry; provide airtight seal around anchors.
  - 3. Apply bead or trowel coat of mastic sealant with minimum thickness of 1/4 inch along coating seams, rough cuts, and as recommended by manufacturer.
  - 4. Use flashing to seal to adjacent construction and to bridge joints in coating substrate.

### 3.4 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Do not cover installed air barriers until required inspections have been completed.
- C. Take digital photographs of each portion of installation prior to covering up air barriers.

3.5 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

## SECTION 074113 - METAL ROOF PANELS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Metal roof panel system of preformed steel panels.
- B. Cover boards.

## 1.2 RELATED REQUIREMENTS

- A. Section 051200 - Structural Steel Framing: Roof framing and purlins.
- B. Section 061000 - Rough Carpentry: Roof sheathing.
- C. Section 072100 - Thermal Insulation: Rigid roof insulation.
- D. Section 079200 - Joint Sealants: Sealing joints between metal roof panel system and adjacent construction.

## 1.3 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. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- C. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2021.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- F. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference 2005 (Reapproved 2017).
- G. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies Current Edition, Including All Revisions.



#### 1.4 SUBMITTALS

- A. See Section 013300 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 square, representing actual roofing metal, thickness, profile, color, and texture.
  - 1. Include typical panel joint in sample.
  - 2. Include typical fastening detail.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.
- H. Test Reports: Indicate compliance of metal roofing system to specified requirements.
- I. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section and with at least three years of experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.
- B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

## 1.7 WARRANTY

- A. See Section 017830 -Warranties and Bonds for additional warranty requirements.
- B. Finish Warranty: Provide 10-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.
- C. Special Warranty: Provide 5-year warranty for weathertightness of roofing system, including agreement to repair or replace metal roof panels that fail to keep out water commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Architectural Metal Roof Panel Manufacturers:
  - 1. MBCI; Battenlok HS: [www.mbc.com/#sle](http://www.mbc.com/#sle).
  - 2. Metal Roofing Systems, Inc; System 2500 - Metal Roof Panels : [www.metalroofingsystems.biz/#sle](http://www.metalroofingsystems.biz/#sle).
  - 3. Petersen Aluminum Corporation; Tite-Loc Plus Panel: [www.pac-clad.com/#sle](http://www.pac-clad.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.

### 2.2 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.
  - 2. Overall: Complete weathertight system tested and approved in accordance with ASTM E1592.
  - 3. Wind Uplift: As indicated on structural drawings.
  - 4. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.

## 2.3 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. Zinc-coated steel complying with ASTM A653/A653M; minimum G60 galvanizing.
    - b. Steel Thickness: Minimum 24 gauge, 0.024 inch.
  - 2. Profile: Standing seam, with minimum 2-inch seam height; concealed fastener system for field seaming with special tool.
  - 3. Texture: Smooth, with intermediate ribs for added stiffness.
  - 4. Length: Full length of roof slope, without lapped horizontal joints.
  - 5. Width: Maximum panel coverage of 12 inches.

## 2.4 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard stainless steel concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

## 2.5 FABRICATION

- A. Panels: Provide factory fabricated panels with applied finish 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.

## 2.6 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; color and gloss as selected by Architect from manufacturer's standard line.
  - 1. Products:
    - a. Arkema, Inc; Kynar 500: [www.arkema.com/#sle](http://www.arkema.com/#sle).

- b. PPG; Duranar: [www.ppgmetalcoatings.com/#sle](http://www.ppgmetalcoatings.com/#sle).
- c. Sherwin-Williams Company; Fluropon: [www.coil.sherwin.com/#sle](http://www.coil.sherwin.com/#sle).
- d. Substitutions: See Section 016000 - Product Requirements.

## 2.7 ACCESSORIES

- A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs 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.
  1. Downspouts: Open face, rectangular profile.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of closed-cell synthetic rubber, neoprene, or PVC.
- 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. Thermal Insulation: Provide rigid type, polyisocyanurite (ISO). See Section 072100 Thermal Insulation.
  1. Thickness: As indicated.
- E. Underlayment: Self-adhering polymer modified asphalt sheet complying with ASTM D1970/D1970M, with strippable release film and top surface of woven polypropylene sheet.
  1. Sheet Thickness: 22 mil, 0.022 inch minimum total thickness.
  2. Self Sealability: Nail sealability in accordance with ASTM D1970/D1970M.
  3. Water Vapor Permeance: 0.1 perm, maximum, when tested in accordance with ASTM E96/E96M using Desiccant Method (Method A).
  4. Products:
    - a. Certaineed Roofing; WinterGuard HT - High Temperature Waterproofing Underlayment: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
    - b. Henry Company; Blueskin PE200HT: [www.henry.com/#sle](http://www.henry.com/#sle).
    - c. Polyglass USA, Inc; Polystick MTS Self-Adhered High Temperature Roof Underlayment: [www.polyglass.us/#sle](http://www.polyglass.us/#sle).

d. Substitutions: See Section 016000 - Product Requirements.

F. Cover Boards

1. Cover Boards: Glass-mat faced gypsum panels complying with ASTM C1177/C1177M.
2. Thickness: 1/4 inch, fire-resistant.
3. Products:
  - a. Georgia-Pacific; DensDeck Prime Roof Boards with EONIC Technology:  
[www.densdeck.com/#sle](http://www.densdeck.com/#sle).
  - b. National Gypsum; Gold Bond DEXcell FA Glass Mat Roof Board:  
[www.goldbondbuilding.com/#sle..](http://www.goldbondbuilding.com/#sle..)
  - c. USG; Securock Glass-Mat Roof Board: [www.usg.com/#sle](http://www.usg.com/#sle).

### PART 3 EXECUTION

#### 3.1 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.

#### 3.2 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.

#### 3.3 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.
1. Form weathertight standing seams incorporating concealed clips, using an automatic mechanical seaming device approved by panel manufacturer.
- D. Insulation: Install insulation between roof covering and supporting members to present a neat appearance; fold, staple, and tape seams unless otherwise approved by Architect.
- E. Cover Boards: Fully adhered cover boards in accordance with roofing manufacturer's instructions and FM (AG) Factory Mutual requirements.

### 3.4 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.

### 3.5 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

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## SECTION 074646 - FIBER CEMENT WALL PANELS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Façade Material: Through-color high density fiber cement panels.
- B. Exposed fastener, horizontally oriented attachment system installed over vertical continuous insulation support members.

## 1.2 RELATED REQUIREMENTS

- A. Section 042000 – Unit Masonry: Panel system substrate.
- B. Section 054000 – Cold-Formed Metal Framing: Wall framing and supports
- C. Section 061000 – Rough Carpentry: Blocking.
- D. Section 072100 – Thermal Insulation: Continuous Insulation.
- E. Section 072700 – Air Barriers: Air, vapor, and water-resistive barrier behind CI.
- F. Section 076200 – Sheet Metal Flashing and Trim: Flashing for penetrations and openings.
- G. Section 079200 – Joint Sealants: Sealing joints between panel system and adjacent construction and fixtures.
- H. Section 089100 – Louvers: Architectural and mechanical louvers.
- I. Section 092116 – Gypsum Board Assemblies: Panel system substrate.

## 1.3 REFERENCE STANDARDS

- A. ASTM C 1185 - 08 Standard Test Methods for Sampling and Testing Non-Asbestos Fiber-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards
- B. ASTM C 1186 - 08 Standard Specification for Flat Fiber-Cement Sheets
- C. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
- D. ASTM E 136 Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees C
- E. NFPA-285 Standard Fire Test Method of Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components



#### 1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including but not limited to:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods for panels and attachment system.
- C. Samples: Submit selection and verification samples for finishes, colors and textures.
  - 1. Selection Samples: Manufacturer's color charts or chips illustrating full range of colors, finishes and patterns available.
  - 2. Verification Samples:
    - a. Finish: Include separate sets of material samples, approximately 6" × 6" or larger, of each color and finish selected, for color approval.
    - b. Structural: 12 inch × 12 inch or larger system sample of panels in thickness specified showing 4-way joint, from an available stock color, including extrusions, anchors, supports, fasteners, closures and other panel accessories, for assembly approval.
- D. Shop Drawings: Show layout, location of joints necessary to accommodate thermal movement, profiles, fastening and anchoring methods, product components and accessories, edge conditions, finish colors and textures.
  - 1. Shop drawings shall be project specific. Typical generic details are not acceptable.
- E. Engineering Calculations: Submit engineering calculations as required by the local building code, showing that the installed panels and attachment system meets the wind load requirements for the project.
- F. Quality Assurance Submittals: Submit the following:
  - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
  - 2. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and physical requirements.
- G. Closeout Submittals: Submit the following:
  - 1. Maintenance Data: Maintenance data for installed products in accordance with Division 1 Closeout Submittals (Maintenance Data and Operation Data) Section. Include methods for maintaining installed products and precautions against cleaning materials and methods detrimental to finishes and performance.

2. Warranty: Warranty documents specified herein.

## 1.5 QUALITY ASSURANCE

- A. Performance Requirements: Provide panels that have been manufactured, fabricated and installed to maintain performance criteria stated by the manufacturer and fabricator without defects, damage or failure.
- B. Qualifications:
  1. Manufacturer Qualifications:
    - a. Company with a minimum of 10 years of continuous experience manufacturing panel material of the type specified.
    - b. Able to provide specified warranty on finish.
    - c. Able to provide a list of 5 other projects of similar size, including approximate date of installation and the name of the Architect for each.
    - d. Able to provide certificate of registration of ISO 9001-2000.
  2. Fabricator Qualifications: The panel system fabricator shall be approved by the panel manufacturer and have a minimum of five years of experience fabricating panel systems for projects of a similar or larger size.
  3. Installer Qualifications: All products listed in this section are to be installed by a single installer trained and/or approved by the Fabricator or Manufacturer.
- C. The panel system Fabricator will prepare the shop drawings in accordance with their standard published product data and criteria established by others. The General Contractor and Installer shall be responsible to verify the information contained therein including all dimensions.
- D. In the interest of maintaining job schedules, the panel system Fabricator will fabricate all materials from the approved set of shop drawings. If field verification of dimensions is required, the general contractor/subcontractor shall be responsible to supply these dimensions to the panel system Fabricator prior to engineering/fabricating of the materials.
- E. Mock-Ups:
  1. Provide a 4' x 4' minimum mock-up covering the different panel and support configurations required on the project. The mockup may be a sample mockup or may remain as part of the finished work if accepted by Architect. Do not proceed with remaining work until workmanship, color, and finish are approved by architect.
- F. Pre-installation Meetings: Conduct a pre-installation meeting of the contractor and installer to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

## 1.6 DELIVERY, STORAGE & HANDLING

- A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Delivery to Fabricator:
  - 1. Deliver materials in manufacturer or fabricator's original, unopened, undamaged containers with identification labels intact.
  - 2. Materials shall be packaged to minimize or eliminate the possibility of damage during shipping. Ensure the panels are secured to the pallet in a way that will not cause damage. Items such as wood side board, wooden lid, and spacers or protective sheeting between the panels shall be used to protect the panels from surface and/or edge damage if required.
  - 3. Stacks should be transported under a waterproof cover.
  - 4. Moving panels that are stacked on pallets should be done with a forklift or a crane. Exercise care in unloading, storing, and installing panels to prevent bending, warping, twisting and surface damage.
- C. Shipment to the Project Site: Materials shall be packaged to minimize or eliminate the possibility of damage during shipping. Items such as wooden side boards, wooden lids, wrapping, and spacers shall be provided.
- D. Storage and Protection:
  - 1. Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.
  - 2. All panel materials must be stored flat on pallets, inside and undercover in dry conditions, protected from weather and other trades. Stack the pallets in a way so that the panels are ventilated.
- E. Handling:
  - 1. When moving sheets or panels, lift evenly to avoid dragging materials across each other and scratching the finished surface.
  - 2. Remove protective films, labels or stickers immediately after installation.

## 1.7 COORDINATION

- A. The General Contractor and Installer responsible for the work of this Section shall coordinate the work of this section with work of other trades affecting, or affected by, this work to assure the steady progress of all the work of the contract.
- B. Before proceeding with installation, the General Contractor shall require the installer to inspect all project conditions affecting the work of this section to assure that all such conditions and work are suitable to satisfactorily receive the work of this section.

## 1.8 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 or which could involve life safety situations.
- B. Field Measurements: Verify actual measurements/openings by field measurements prior to release for fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

## 1.9 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer's Warranty: Provide manufacturer's limited ten (10) year warranty covering defects in materials. Complete forms in Owner's name and register with manufacturer.
- C. Fabricator Warranty: Submit Fabricator's warranty executed by authorized company official. Warranty shall guarantee the attachment system will be free from defects in materials and workmanship for a period of three years.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. High Density Fiber Cement Panels
  - 1. EQUITONE; Tectiva (Basis-of-Design): [www.equitone.com/#sle](http://www.equitone.com/#sle).
    - a. Contact: EQUITONE, Wendy Davis, (469) 243-5506, [wendy.davis@etexgroup.com](mailto:wendy.davis@etexgroup.com) 3269 Regal Drive, Alcoa, TN 37701.
  - 2. American Fiber Cement Corporation; Patina: [www.americanfibercement.com/#sle](http://www.americanfibercement.com/#sle).
  - 3. Swisspearl; Vintago: [www.swisspearl.com/#sle](http://www.swisspearl.com/#sle).
- B. Support Framing System
  - 1. Universe Corporation; Universe 7000 Continuous Insulation (Basis-of-Design): [www.universefacadesolutions.com/#sle](http://www.universefacadesolutions.com/#sle).
    - a. Contact: Universe Corporation, Mitch Fernsler (929)-246-8784, [Mitchfernsler@universecorp.com](mailto:Mitchfernsler@universecorp.com) Bridgeton, MO; Edison, NJ; Las Vegas, NV
  - 2. Architectural Panel Solutions; [www.architecturalpanelsolutions.com/#sle](http://www.architecturalpanelsolutions.com/#sle).
  - 3. Knight Wall Systems; [knightwallsystems.com/#sle](http://knightwallsystems.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.

## 2.2 FACADE MATERIAL

### A. Product: Through-Color High-Density Fiber Cement Panels

1. Application: Exterior.
2. Thickness: 5/16" (8 mm).
3. Material: Through-color, textured panel, hydrophobic surface.
4. Physical Characteristics: Ref: ASTM C1185 and ASTM C1186
  - a. Density Dry: Minimum 1.65 kg/m<sup>3</sup> (103 lb/ft<sup>3</sup>)
  - b. Bending strength @ ambient, perpendicular: 24.0 N/mm<sup>2</sup> (2,465 lbf/in<sup>2</sup>)
  - c. Bending strength @ ambient, parallel: 17.0 N/mm<sup>2</sup> (2,465 lbf/in<sup>2</sup>)
  - d. Modulus of elasticity @ ambient, perpendicular: >15,000N/mm<sup>2</sup> (>2,175,570 lbf/in<sup>2</sup>)
  - e. Hygric movement 0-100%, mean: 0-100%, mean: 1.60 mm/m
  - f. Porosity 0-100%: < 20 %
  - g. Thermal conductivity: 0.6 W/mK

### B. Color/Finish

1. Color: As selected by Architect from manufacturers full color range. Basis-of-design: EQUITONE Tectiva TE85.
2. Finish Performance: No change, 2000 hours of accelerated weathering with color evaluation, CCHD Performance Test Report.

### C. Source Quality

1. Obtain composite panel products from a single manufacturer.
2. Installation contractor must be trained and approved by the manufacturer's representative.

## 2.3 FACADE SYSTEM

### A. Attachment System:

1. Horizontal system: comprised of horizontally-oriented hat and zee extrusions. Foam tape will be applied to the extrusions to provide for 3-way movement. Other movement will be accommodated by fixing and floating holes drilled into the panels. Horizontal extrusions will have pre-formed splice clips to bridge between vertical supporting structure as necessary. Extrusions will be black in color.

2. Vertical CI system: comprised of vertically-oriented hat extrusions. Vertical hat extrusions will be nominally ½" inch deep with 1/8 " inch thick at fastener landing pads directly attached on top of rigid mineral wool insulation at typical spacing as required by structural engineer. Vertical hat extrusions will attach to building via long fasteners with sufficient length to penetrate through the rigid insulation back to the structure.
3. System depth: 4" nominal depth (from sheathing or CMU to backside of panel)
4. Material: Extruded Aluminum.
5. Exposed Fastener System: Rivets will be corrosion resistant and color-matched to panel color.
6. Perforated Vent Screen: Manufacturer's standard, furnished by fabricator at base of panels where exposed. Color to be selected from manufacturer's standard color range.
7. Perforated Insect/Vermin Screen: Manufacturer's standard, furnished by fabricator at locations indicated and as required to prevent Insect/Vermin to access cavity behind panels. Color to be selected from manufacturer's standard color range.
8. Jamb/Systems Closures: Fiber cement panel closures where indicated. Pre-finished aluminum sheet closures at all other locations, color to be selected from manufacturer's standard color range. Furnished by fabricator.
9. Aluminum Joint and Corner Closures: Manufacturer's standard products as detailed.
10. (2) ¼" thermal isolators will be provided between the extrusions and sheathing to provide ventilation and a drain plane.
11. System is designed for wind load as indicated on structural drawings.

B. Fabrication

1. Fabricate wall panels and accessory items in accordance with manufacturer's tolerance and performance recommendations.
2. Fabricate wall panels to the size, configuration and layout as shown on approved shop drawing submittals.
3. Form panel lines, breaks and angles to be sharp and true, with surfaces that are free from warp or buckle.
4. Where final dimensions cannot be established by field measurements, provide allowance for field adjustment as recommended by the fabricator. Field fabrication shall be allowed where necessary but kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible.
5. Panels shall be marked to coordinate with the approved shop drawings.
6. Panels using materials with a grain or directionality shall be fabricated to run in the same direction when installed unless otherwise specified or illustrated on approved shop drawings.

7. Fasteners in profile shall accommodate thermal expansion/contraction of metal and not interfere with panel application.

C. Attachment system does not include:

1. Insulation.
2. Wood blocking, furring.
3. Sheathing and gypsum drywall.
4. Sealant and primers.

## 2.4 RELATED MATERIALS

- A. Flashings are not considered to be part of this specification section, unless specifically described as being provided by the wall panel installer.
- B. Metal stud framing and/or furring (16-gage minimum) as may be required for the support of the panel wall is not considered to be part of this specification section.
- C. Air/Moisture Barrier is required behind the panel system in accordance with Section 072700 – Air Barriers. Must be self-healing fabric or liquid applied system, installed per manufacturer's instructions. For NFPA-285 applications, the only compliant and allowable air & moisture barriers are as follows: Dorken Delta Fassade-S, Dorken Delta Vent-SA, VaproShield RevealShield SA, VaproShield WrapShield, VaproShield WallShield, Tyvek CommercialWrap, Dow Corning DefendAir 200; GE Momentive SEC2500, 2600 or 2600R.
- D. Insulation is to be rigid mineral wool insulation, 2-1/2" thick, in accordance with Section 072100 – Thermal Insulation.

## 2.5 PERFORMANCE REQUIREMENTS

- A. Durability classification (EN 12467): Category A
- B. Strength classification (EN 12467): Class 4
- C. Fire reaction (EN 13501-1): A2-s1-d0
- D. ASTM E84-Zero Flame Spread and smoke development of < 5
- E. ASTM E-136 - passed
- F. Impermeability test: Ok
- G. Warm water test: Ok
- H. Soak dry test: Ok
- I. Freeze thaw test: Ok

## PART 3 EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

### 3.2 EXAMINATION

- A. Verify substrate conditions which have been previously installed under other sections or by other installers are acceptable for product installation in accordance with manufacturer's instructions. Notify Contractor of unsatisfactory preparation. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Surfaces to receive panels shall be even, smooth, dry, and free from defects detrimental to the installation of the panel system. Notify Contractor in writing of conditions detrimental to proper and timely completion of the work.
- C. Confirm exterior sheathing is plumb and level, with no deflection greater than 1/4" inch (6mm) in 20 feet (6096mm).
- D. Visually check that air and moisture barrier behind panel system appears to be installed correctly before proceeding or notify the General Contractor if there are deficiencies that must be addressed before commencing the panel installation.

### 3.3 PREPARATION

- A. Clean panel surfaces thoroughly prior to installation. Remove any cutting or drilling dust from the surface of the panel using a micro-soft cloth.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.4 INSTALLATION

- A. Install panel system plumb and level and accurately spaced in accordance with manufacturer's recommendations and approved submittals and shop drawings.
- B. Do not install panels or component parts which are observed to be defective or damaged including, but not limited to: warped, bowed, abraded, scratched, and broken members.
- C. Do not cut or trim component parts during installation in a manner that would damage the finish, decrease the strength, or result in a visual imperfection or a failure in performance. Return component parts which require alteration to the shop for re-fabrication or replacement.
- D. Panels with grain or directionality are to be installed in same direction, unless otherwise noted on the approved shop drawings.



- E. Adjust final panel installation so that all joints are true and even throughout the installation. Panels out of plane shall be adjusted with the surrounding panels to minimize any imperfection.
- F. Accessory Items: Install accessory items with fastening method appropriate for use with adjoining construction as indicated on drawings and as recommended by the Fabricator or Manufacturer.
- G. Anchor panels and sub-framing securely per engineering recommendations and in accordance with approved shop drawings to allow for necessary movement and structural support.
- H. Repair panels with minor damage. Remove and replace panels damaged beyond repair as a direct result of the panel installation.
- I. Fasten wall panel system with fasteners approved for use with supporting substrate.
- J. Provide for necessary structural movement as indicated on the approved shop drawings.
- K. For exterior applications, comply with local codes and structural engineer's fastening calculations along with manufacturer's recommendations for fastener spacing.
- L. Do not block vertical airflow at windows, doors, eaves, or at the base of the building. Airflow shall be continuous from bottom to top providing air movement behind each panel consistent with standard system depth. Air flow behind the panels is critical to the performance of rain screen constructions.

### 3.5 CLEANING

- A. Remove temporary coverings and protection of adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.
- B. After the installation cleaning, cleaning during construction shall become the responsibility of the General Contractor.

### 3.6 PROTECTION

- A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

## SECTION 076200 - SHEET METAL FLASHING AND TRIM

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, and exterior penetrations.
- B. Sealants for joints within sheet metal fabrications.
- C. Precast concrete splash pads.

## 1.2 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.
- B. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2023.
- E. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.
- F. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction 2022.
- G. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- H. CDA A4050 - Copper in Architecture - Handbook current edition.
- I. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

## 1.3 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 3 years of documented experience.

#### 1.4 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

#### 2.1 MANUFACTURERS

- A. Sheet Metal Flashing and Trim:
  - 1. ALUCOBOND by 3A Composites USA: [www.alucobondusa.com/#sle](http://www.alucobondusa.com/#sle).
  - 2. Fairview Architectural LLC: [www.fairview-na.com/#sle](http://www.fairview-na.com/#sle).
  - 3. Petersen Aluminum Corporation: [www.pac-clad.com/#sle](http://www.pac-clad.com/#sle).

#### 2.2 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch thick base metal.
- B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch thick base metal, shop pre-coated with PVDF coating.
  - 1. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
  - 2. Color: To match approved sample.
- C. Anodized Aluminum: ASTM B209/B209M, 3005 alloy, H12 or H14 temper; 20 gauge, 0.032 inch thick; clear anodized finish.
  - 1. Clear Anodized Finish: AAMA 611, AA-M12C22A41, Class I, clear anodic coating not less than 0.7 mil, 0.0007 inch thick.
- D. Pre-Finished Aluminum: ASTM B209/B209M, 3005 alloy, H12 or H14 temper; 18 gauge, 0.040 inch thick; plain finish shop pre-coated with silicone modified polyester coating.
  - 1. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; pretreated metal with two-coat system including primer and color coat with at least 70 percent PVDF coating.
  - 2. Color: To match approved sample.
- E. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gauge, 0.0156 inch thick; smooth No. 4 - Brushed finish.

- F. Copper: ASTM B370, cold rolled 16 oz/sq ft, 24 gauge, 0.0216 inch thick; natural finish.

### 2.3 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; 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 long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

### 2.4 GUTTERS AND DOWNSPOUTS

- A. Gutters: SMACNA (ASMM) Rectangular profile.
- B. Downspouts: Rectangular profile.
- C. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 10 years in accordance with SMACNA (ASMM).
- D. Accessories: Profiled to suit gutters and downspouts.
  - 1. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
  - 2. Gutter Supports: Brackets.
  - 3. Downspout Supports: Brackets.
- E. Splash Pads: Precast concrete type, of size and profiles indicated; minimum 3,000 psi at 28 days, with minimum 5 percent air entrainment.
- F. Downspout Boots: Cast iron with PVDF coating.
- G. Downspout Extenders: Same material and finish as downspouts.
- H. Seal metal joints.

### 2.5 EXTERIOR PENETRATION FLASHING PANELS

- A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

## 2.6 ACCESSORIES

- A. Fasteners: Galvanized steel, with soft neoprene washers.
- B. Primer Type: Zinc chromate.
- C. Concealed Sealants: Non-curing butyl sealant.
- D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

## PART 3 EXECUTION

### 3.1 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. Secure gutters and downspouts in place with concealed fasteners.
- E. Slope gutters 1/4 inch per 10 feet, minimum.
- F. Connect downspouts to downspout boots, and seal connection watertight.
- G. Set splash pads under downspouts.

END OF SECTION

## SECTION 079200 - JOINT SEALANTS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

## 1.2 RELATED REQUIREMENTS

- A. Section 092116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

## 1.3 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 C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants 2018 (Reapproved 2022).
- C. ASTM C834 - Standard Specification for Latex Sealants 2017.
- D. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2022.
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- F. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems 2016.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- H. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2022.
- I. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.
- J. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints 2019 (Reapproved 2020).
- K. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness 2015 (Reapproved 2021).

- L. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension 2016 (Reapproved 2021).
- M. ASTM D638 - Standard Test Method for Tensile Properties of Plastics 2022.
- N. SCAQMD 1168 - Adhesive and Sealant Applications 1989, with Amendment (2022).

#### 1.4 SUBMITTALS

- A. See Section 013300 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. Sample product warranty.
  - 7. Certification by manufacturer indicating that product complies with specification requirements.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.
- F. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
- G. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
- H. Field Quality Control Log: Submit filled-out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.
- I. Manufacturer's qualification statement.
- J. Installer's qualification statement.
- K. Executed warranty.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- D. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
  - 1. Adhesion Testing: In accordance with ASTM C794.
  - 2. Compatibility Testing: In accordance with ASTM C1087.
  - 3. Allow sufficient time for testing to avoid delaying the work.
  - 4. Deliver sufficient samples to manufacturer for testing.
  - 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
  - 6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.
- E. Field Quality Control Plan:
  - 1. Visual inspection of entire length of sealant joints.
  - 2. Nondestructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
    - a. For each different sealant and substrate combination, allow for one test every 12 inches in the first 10 linear feet of joint and one test every 24 inches thereafter.
    - b. If any failures occur in the first 10 linear feet, continue testing at 12 inches intervals at no extra cost to Owner.
  - 3. Field testing agency's qualifications.
  - 4. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- F. Field Adhesion Test Procedures:
  - 1. Allow sealants to fully cure as recommended by manufacturer before testing.
  - 2. Have a copy of the test method document available during tests.



3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
  4. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- G. Nondestructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.

## 1.6 WARRANTY

- A. See Section 017830 - Warranties and Bonds, for additional warranty requirements.
- B. **Manufacturer Warranty:** Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. **Nonsag Sealants:**
  1. Dow: [www.dow.com/#sle](http://www.dow.com/#sle).
  2. Pecora Corporation: [www.pecora.com/#sle](http://www.pecora.com/#sle).
  3. Sika Corporation: [www.usa.sika.com/#sle](http://www.usa.sika.com/#sle).
  4. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com/#sle](http://www.tremcosealants.com/#sle).
  5. W.R. Meadows, Inc: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
  6. Substitutions: See Section 016000 - Product Requirements.
- B. **Self-Leveling Sealants:**
  1. Dow: [www.dow.com/#sle](http://www.dow.com/#sle).
  2. Pecora Corporation: [www.pecora.com/#sle](http://www.pecora.com/#sle).
  3. Sika Corporation: [www.usa.sika.com/#sle](http://www.usa.sika.com/#sle).
  4. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com/#sle](http://www.tremcosealants.com/#sle).
  5. W.R. Meadows, Inc: [www.wrmeadows.com/#sle](http://www.wrmeadows.com/#sle).
  6. Substitutions: See Section 016000 - Product Requirements.

## 2.2 JOINT SEALANT APPLICATIONS

### A. Scope:

1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
  - a. Wall expansion and control joints.
  - b. Joints between door, window, and other frames and adjacent construction.
  - c. Joints between different exposed materials.
  - d. Openings below ledge angles in masonry.
  - e. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
  - a. Joints between door, window, and other frames and adjacent construction.
  - b. Other joints indicated below.
3. Do not seal the following types of joints:
  - a. Intentional weep holes in masonry.
  - b. Joints indicated to be treated with manufactured expansion joint cover, or some other type of sealing device.
  - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
  - d. Joints where installation of sealant is specified in another section.
  - e. Joints between suspended panel ceilings/grid and walls.

### B. Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.

1. Lap Joints in Sheet Metal Fabrications: Butyl rubber, noncuring.
2. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane traffic-grade sealant.
3. Wiring Slots in Concrete Paving: Self-leveling epoxy sealant.
4. Splashpad and other wet locations: Nonsag polyurethane sealant for continuous immersion.

### C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.

1. Wall and Ceiling Joints in Nonwet Areas: Acrylic emulsion latex sealant.

2. Wall and Ceiling Joints in Wet Areas: Nonsag polyurethane sealant for continuous liquid immersion.
  3. Floor Joints in Wet Areas: Nonsag polyurethane non-traffic-grade sealant suitable for continuous liquid immersion.
  4. Joints between Tile in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
  5. Narrow Control Joints in Interior Concrete Slabs: Self-leveling epoxy sealant.
  6. Other Floor Joints: Self-leveling polyurethane traffic-grade sealant.
- D. Interior Wet Areas: restrooms; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.
- E. Sound-Rated Assemblies: Walls and ceilings identified as STC-rated, sound-rated, or acoustical.

### 2.3 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

### 2.4 NONSAG JOINT SEALANTS

- A. Nonstaining 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: Match adjacent finished surfaces.
  6. Service Temperature Range: Minus 20 to 180 degrees F.
- 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. Polymer Sealant: ASTM C920; single component, cured sealant is paintable and mold/mildew resistant, low odor and VOC, and ultraviolet (UV) resistant.
1. Color: White.

- D. 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 50 percent, minimum.
  2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
  3. Color: Match adjacent finished surfaces.
  4. Service Temperature Range: Minus 40 to 180 degrees F.
- E. Type \_\_\_ - Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multicomponent; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface.
1. Movement Capability: Plus and minus 35 percent, minimum.
- F. Nonsag 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. Hardness Range: 20 to 30, Shore A, when tested in accordance with ASTM C661.
  3. Color: Match adjacent finished surfaces.
- G. Two-Component Epoxy Sealant: Flexible epoxy joint filler, solvent-free, used for embedding and sealing wire and traffic detection loops in concrete and asphalt pavement, and filling saw-cut control joints of interior concrete slabs.
1. Hardness: 62, Shore D, when tested in accordance with ASTM D2240.
  2. Tensile Strength: 1,400 psi, when tested in accordance with ASTM D638.
  3. Elongation at Break: 90 percent, when tested in accordance with ASTM D638.
  4. Color: As selected by Architect from manufacturer's standard line.
- H. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, nonstaining, nonbleeding, nonsagging; not intended for exterior use.
1. Color: Standard colors matching finished surfaces, Type OP (opaque).
  2. Grade: ASTM C834; Grade 0 Degrees F (Minus 18 Degrees C).
- I. Noncuring Butyl Sealant: Solvent-based, single component, nonsag, nonskinning, nonhardening, nonbleeding; nonvapor permeable; intended for fully concealed applications.

## 2.5 SELF-LEVELING JOINT SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent ; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
1. Movement Capability: Plus and minus 25 percent, minimum.
  2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
  3. Color: To be selected by Architect from manufacturer's standard range.
  4. Service Temperature Range: Minus 40 to 180 degrees F.
- B. Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single component; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
1. Movement Capability: Plus and minus 25 percent, minimum.
  2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
  3. Color: To be selected by Architect from manufacturer's standard range.
  4. Service Temperature Range: Minus 40 to 180 degrees F.
- C. Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Composition: Multicomponent, 100 percent solids by weight.
  2. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
  3. Color: Match adjacent finished surfaces.
  4. Joint Width, Minimum: 1/8 inch.
  5. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.
- D. Semi-Self-Leveling Polyurethane Sealant: Intended for expansion joints in sidewalks, swimming pool decks, plazas, floors and other horizontal surfaces with up to 6 percent slope.
1. Composition: Single or multicomponent.
  2. Durometer Hardness, Type A: 35 to 45, minimum, when tested in accordance with ASTM D2240.
  3. Color: Match adjacent finished surfaces.

4. Tensile Strength: 250 to 300 psi in accordance with ASTM D412.

## 2.6 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
  1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
  2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
  3. Open Cell: 40 to 50 percent larger in diameter than joint width.
  4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

## PART 3 EXECUTION

### 3.1 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.

### 3.2 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.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in an inconspicuous area to verify that it does not stain or discolor slab.

### 3.3 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. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker backing tape where backer rod cannot be used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- G. 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.
- H. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
- I. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

### 3.4 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- C. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.
- D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

## SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Fire-rated hollow metal doors and frames.
- C. Thermally insulated hollow metal doors with frames.
- D. Accessories, including glazing.

## 1.2 RELATED REQUIREMENTS

- A. Section 087100 - Door Hardware.
- B. Section 088000 - Glazing: Glass for doors and borrowed lites.
- C. Section 099113 - Exterior Painting: Field painting.
- D. Section 099123 - Interior Painting: Field painting.

## 1.3 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) 2017.
- 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 2022.
- 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 2018a.
- I. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.
- J. ASTM C476 - Standard Specification for Grout for Masonry 2023.
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- L. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames 2016.
- M. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- N. ITS (DIR) - Directory of Listed Products Current Edition.
- O. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.
- P. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.
- Q. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2017.
- R. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- S. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- T. UL (DIR) - Online Certifications Directory Current Edition.
- U. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.

#### 1.4 SUBMITTALS

- A. See Section 013300 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. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- F. Manufacturer's Qualification Statement.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Maintain at project site copies of reference standards relating to installation of products specified.

## 1.6 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.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
  - 1. Ceco Door, an Assa Abloy Group company: [www.assaabloydss.com/#sle](http://www.assaabloydss.com/#sle).
  - 2. Curries, 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. Steelcraft, an Allegion brand: [www.allegion.com/#sle](http://www.allegion.com/#sle).
  - 5. Substitutions: See Section 016000 - Product Requirements.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
  - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
  - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
  - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
  - 4. Door Edge Profile: Manufacturers standard for application indicated.
  - 5. Typical Door Face Sheets: Flush.

6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.
  7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
  8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
    - a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.
- 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.

### 2.3 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors: Thermally insulated.
  1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 2 - Heavy-duty.
    - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
    - e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
  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, nominal.
  5. Door Face Sheets: Flush.

6. Weatherstripping: Refer to Section 087100.

C. Interior Doors, Non-Fire-Rated:

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
  - a. Level 2 - Heavy-duty.
  - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
  - c. Model 1 - Full Flush.
  - d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
3. Door Thickness: 1-3/4 inches, nominal.
4. Door Face Sheets: Flush.

D. Fire-Rated Doors:

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
  - a. Level 2 - Heavy-duty.
  - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
  - c. Model 1 - Full Flush.
  - d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
  - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
  - a. Attach fire rating label to each fire rated unit.
4. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
5. Door Thickness: 1-3/4 inches, nominal.
6. Door Face Sheets: Flush.
7. Door Finish: Factory primed and field finished.

## 2.4 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Full profile/continuously welded type.
  - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
  - 2. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum.
  - 3. Weatherstripping: Separate, see Section 087100.
- D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
  - 1. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- E. Door Frames, Fire-Rated: Full profile/continuously welded type.
  - 1. Fire Rating: Same as door, labeled.
  - 2. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- F. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- G. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
- H. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

## 2.5 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.
- B. Factory Finish: Complying with ANSI/SDI A250.3, manufacturer's standard coating.
  - 1. Color: As indicated on drawings.
- C. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15 mil, 0.015 inch dry film thickness (DFT) per coat; provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
  - 1. Fire-Rated Frames: Comply with fire rating requirements indicated.

## 2.6 ACCESSORIES

- A. Door Window Frames: Door window frames with glazing securely fastened within door opening.
  - 1. Glazing: 1/4 inch thick, tempered glass, in compliance with requirements of authorities having jurisdiction.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Astragals and Edges for Double Doors: Pairs of door astragals, and door edge sealing and protection devices.
  - 1. UL listed products in compliance with requirements of authorities having jurisdiction.
  - 2. Provide surface mounted astragal to cover or fill space for full door height between pair of doors or door and adjacent jamb.
  - 3. Astragal Type: Split, two parts, and with automatic locking, cutouts for other door hardware, and sealing gasket.
  - 4. Edge Type: Beveled edge
  - 5. Material: Manufacturers standard.
  - 6. Provide non-corroding fasteners at exterior locations.
- D. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
- E. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
- F. 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.
- G. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

## PART 3 EXECUTION

### 3.1 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.

3.2 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.3 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. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Install door hardware as specified in Section 087100.
- F. Coordinate installation of electrical connections to electrical hardware items.
- G. Touch up damaged factory finishes.

3.4 TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.5 ADJUSTING

- A. Adjust for smooth and balanced door movement.

3.6 SCHEDULE

- A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

## SECTION 083323 - OVERHEAD COILING DOORS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Exterior coiling doors.
- B. Electric operators and control stations.
- C. Wiring from electric circuit disconnect to operators and control stations.

## 1.2 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 087100 - Door Hardware: Cylinder cores and keys.
- C. Section 099113 - Exterior Painting: Field paint finish.
- D. Section 099123 - Interior Painting: Field paint finish.
- E. See electrical drawings for power to disconnect.

## 1.3 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- D. ITS (DIR) - Directory of Listed Products Current Edition.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- F. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2008 (Reaffirmed 2020).
- G. NEMA MG 1 - Motors and Generators 2021.
- H. UL (DIR) - Online Certifications Directory Current Edition.
- I. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems Current Edition, Including All Revisions.



#### 1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Provide general construction, electrical equipment, and component connections and details.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- D. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.
- C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose specified and indicated.

#### 1.6 WARRANTY

- A. See Section 017830 - Warranties and Bonds, for additional warranty requirements.
- B. Manufacturer Warranty: Provide five-year manufacturer warranty for three-ply multifilament polyester fabric curtain. Complete forms in Owner's name and register with manufacturer.
- C. Manufacturer Warranty: Provide 2-year manufacturer warranty for roller shaft counterbalance assembly. Complete forms in Owner's name and register with manufacturer.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Overhead Coiling Doors:
  - 1. C.H.I. Overhead Doors; Model 6180: [www.chiohd.com/#sle](http://www.chiohd.com/#sle).
  - 2. Cornell Iron Works, Inc: [www.cornelliron.com/#sle](http://www.cornelliron.com/#sle).

3. The Cookson Company: [www.cooksondoor.com/#sle](http://www.cooksondoor.com/#sle).
4. Substitutions: See Section 016000 - Product Requirements.

## 2.2 COILING DOORS

### A. Exterior Coiling Doors: Steel slat curtain.

1. Capable of withstanding positive and negative wind loads of 20 psf without undue deflection or damage to components.
2. Sandwich Slats: Manufacturer's standard, with core of foamed-in-place polyurethane insulation; minimum R-value of 4.88.
3. Nominal Slat Size: 2 inches wide by required length.
4. Finish: Powder-coated, color as selected from manufacturers full color range.
5. Guide, Angles: Galvanized steel.
6. Guides, Formed Sheet Metal: Galvanized steel.
7. Hood Enclosure: Manufacturer's standard; primed steel.
8. Mounting: As indicated on drawings.

## 2.3 MATERIALS AND COMPONENTS

### A. Metal Curtain Construction: Interlocking slats.

1. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
2. Weatherstripping for Exterior Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
3. Steel Slats: Minimum thickness, 20 gauge; ASTM A653/A653M galvanized steel sheet.

### B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.

### C. Guides - Angle: ASTM A36/A36M metal angles, size as indicated.

1. Hot-dip galvanized in compliance with ASTM A123/A123M.

### D. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.

### E. Lock Hardware:

1. For motor operated units, additional lock or latching mechanisms are not required.

- F. Roller Shaft Counterbalance: Steel pipe and helical 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 nominal force to operate.

## 2.4 ELECTRIC OPERATION

- A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
  - 1. Provide interlock switches on motor operated units.
- B. Electric Operators:
  - 1. Mounting: Side mounted.
  - 2. Motor Enclosure:
    - a. Interior Coiling Doors: NEMA MG 1, Type 1; open drip proof.
  - 3. Motor Rating: 3/4 HP; continuous duty.
  - 4. Motor Voltage: 120 volts, single phase, 60 Hz.
  - 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
  - 6. Controller Enclosure: NEMA 250, Type 4.
  - 7. Opening Speed: 12 inches per second.
  - 8. Brake: Manufacturer's standard type, activated by motor controller.
  - 9. Manual override in case of power failure.
  - 10. See electrical drawings for electrical connections.
- C. Control Station: Provide standard three button, 'Open-Close-Stop' momentary-contact control device for each operator complying with UL 325.
  - 1. 24 volt circuit.
  - 2. Surface mounted, at interior door jamb.
  - 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
    - a. Primary Device: Provide electric sensing edge, wireless sensing, NEMA 1 photo eye sensors, or NEMA 4X photo eye sensors as required with momentary-contact control device.
- D. Safety Edge: Located at bottom of coiling door, full width, electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object, hollow neoprene covered.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that adjacent construction is suitable for door installation.
- B. Verify that electrical services have been installed and are accessible.
- C. Verify that door opening is plumb, header is level, and dimensions are correct.
- D. Notify Architect of any unacceptable conditions or varying dimensions.
- E. Commencement of installation indicates acceptance of substrate and door opening conditions.

### 3.2 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.
- E. Coordinate installation of electrical service.
- F. Complete wiring from disconnect to unit components.
- G. Install enclosure and perimeter trim.

### 3.3 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch.
- C. Maximum Variation From Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet straight edge.

### 3.4 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

3.5 CLEANING

- A. Clean installed components.
- B. Remove labels and visible markings.

END OF SECTION

## SECTION 084313 - ALUMINUM-FRAMED STOREFRONTS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Infill panels of louvers.

## 1.2 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 088000 - Glazing: Glass and glazing accessories.
- C. Section 122113 - Horizontal Louver Blinds: Attachments to framing members.

## 1.3 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site 2015.
- B. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections 2009.
- C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.
- F. 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.
- G. 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).

## 1.4 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.

#### 1.5 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, and internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit two samples in size illustrating finished aluminum surface, glass, infill panels, glazing materials.
- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.
  - 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
    - a. Insulating Glass Certification Council (IGCC).
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

#### 1.8 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

## 1.9 WARRANTY

- A. See Section 017830 - Warranties and Bonds, 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

### 2.1 MANUFACTURERS

- A. Aluminum-Framed Storefronts:
  - 1. Kawneer North America: [www.kawneer.com/#sle](http://www.kawneer.com/#sle).
  - 2. Oldcastle Building Envelope: [www.oldcastlebe.com/#sle](http://www.oldcastlebe.com/#sle).
  - 3. YKK AP America, Inc: [www.ykkap.com/commercial/#sle](http://www.ykkap.com/commercial/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.

### 2.2 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

- A. Center-Set Style, Thermally-Broken:
  - 1. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.

### 2.3 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
  - 1. Glazing Rabbet: For 1 inch insulating glazing.
  - 2. Finish: Superior performing organic coatings.
    - 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.
  - 3. Finish Color: As selected by Architect from manufacturer's standard line.



4. 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.
5. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
6. 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.
7. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
8. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
9. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.

B. Performance Requirements

1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
  - a. 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 maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.
3. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.
4. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.

2.4 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
  1. Glazing Stops: Flush.
- B. Glazing: See Section 088000.

## 2.5 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Exposed Flashings: Aluminum sheet, 20 gauge, 0.032 inch minimum thickness; finish to match framing members.
- D. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
- E. Sealant for Setting Thresholds: Non-curing butyl type.
- F. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

## 2.6 FINISHES

- A. Superior Performing Organic Coatings 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 aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.
  - 1. Manufacturers:
    - a. PPG; Duranar: [www.ppgmetalcoatings.com/#sle](http://www.ppgmetalcoatings.com/#sle).
    - b. Sherwin-Williams Company; Fluropon: [www.coil.sherwin.com/#sle](http://www.coil.sherwin.com/#sle).
    - c. Substitutions: See Section 016000 - Product Requirements.
- B. Color: As selected by Architect from manufacturer's full range.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

## PART 3 EXECUTION

### 3.1 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.

### 3.2 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.

- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. 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. Install glass and infill panels using glazing method required to achieve performance criteria; see Section 088000.
- J. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

### 3.3 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

### 3.4 FIELD QUALITY CONTROL

- A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.

### 3.5 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.

3.6 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

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SECTION 086200 - UNIT SKYLIGHTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Skylights with integral frame.
- B. Integral insulated curb.

1.2 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Wood framing for rough opening.

1.3 REFERENCE STANDARDS

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights 2022.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2021a.
- C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.
- E. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights 2019c.

1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Include structural, thermal, and daylighting performance values.
- C. Shop Drawings: Indicate configurations, dimensions, locations, fastening methods, and installation details.
- D. Grade Substantiation: Prior to submitting shop drawings or starting fabrication, submit one of the following showing compliance with specified grade:
  - 1. Evidence of AAMA Certification.
  - 2. Evidence of WDMA Certification.

3. Evidence of CSA Certification.
4. Test report(s) by independent testing agency itemizing compliance and acceptable to authorities having jurisdiction.

E. Manufacturer's qualification statement.

F. Installer's qualification statement.

## 1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not less than three years experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years experience.

## 1.6 WARRANTY

A. See Section 017830 - Warranties and Bonds, for additional warranty requirements.

B. Manufacturer Warranty: Provide five-year manufacturer warranty including coverage for leakage due to defective skylight materials or construction. Complete forms in Owner's name and register with manufacturer.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

A. Unit Skylights:

1. American Skylights a division of the Andi Group; Thermally Broken & Insulated Self Flashing (Model TSF): [www.americanskylights.com/#sle](http://www.americanskylights.com/#sle).
2. Kingspan Light + Air, LLC; Polycarbonate Unit Skylight: [www.kingspanlightandair.us/#sle](http://www.kingspanlightandair.us/#sle).
3. Velux America, Inc; VELUX Dynamic Dome: [www.veluxusa.com/#sle](http://www.veluxusa.com/#sle).
4. Wasco Skylights - Part of the VELUX Group; Wasco EcoSky Unit Skylight : [www.wascoskylights.com/#sle](http://www.wascoskylights.com/#sle).
5. Substitutions: See Section 016000 - Product Requirements.

### 2.2 SKYLIGHTS

A. Skylights: Factory-assembled glazing in aluminum frame, free of visual distortion, and weathertight.

1. Shape: Rectangular dome.
2. Glazing: Double.
3. Operation: None; fixed.
4. Roof Slope: As indicated on drawings.
5. Nominal Size: As indicated on drawings.

### 2.3 PERFORMANCE REQUIREMENTS

#### A. Provide unit skylights that comply with the following:

1. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific skylight type:
  - a. Performance Grade (PG): Equivalent to or greater than specified design pressure.
2. Allow for expansion and contraction within system components caused by a cycling surface temperature range of 170 degrees F without causing detrimental effects to system or components.

### 2.4 DESIGN CRITERIA

#### A. Unit Skylight Design: Design and size components to withstand dead loads and live loads caused by snow, hail, and positive and negative wind loads acting on skylight unit without damage or permanent set.

1. Regulatory Requirements: Comply with applicable code criteria for loads.
2. Design Loads: As indicated on drawings.

### 2.5 COMPONENTS

#### A. Double Glazing: Acrylic plastic; factory sealed.

1. Outer Glazing: Clear transparent.
2. Inner Glazing: White translucent.
3. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.66, nominal.
4. Visible Light Transmittance (VLT): 60 percent minimum.
5. Solar Heat Gain Coefficient (SHGC): 0.45, nominal.

#### B. Frames: ASTM B221 ASTM B221M Extruded aluminum thermally broken, reinforced and welded corner joints, integral curb frame mounting flange and counterflashing to receive roofing flashing system, with integral condensation collection gutter, glazing retainer; clear anodized finish.



- C. Support Curbs: Sheet aluminum ASTM B209/B209M, sandwich construction; 1 inch wide, 10 inches high; glass fiber insulation; with integral flange for anchorage to roof deck.

## 2.6 ACCESSORIES

- A. Anchorage Devices: Type recommended by manufacturer, concealed.
- B. Counterflashings: Same metal type and finish as skylight frame.
- C. Protective Back Coating: Zinc molybdate alkyd.
- D. Sealant: Elastomeric, silicone or polyurethane, compatible with material being sealed .

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that openings and substrate conditions are ready to receive work of this section.

### 3.2 PREPARATION

- A. Apply protective back coating on aluminum surfaces of skylight units that will be in contact with cementitious materials or dissimilar metals.

### 3.3 INSTALLATION

- A. Install unit skylights in accordance with manufacturer's instructions and ASTM E2112.
- B. Install aluminum curb assembly, fastening securely to roof decking; flash curb assembly into roofing system.
- C. Install skylight units and mount securely; install counterflashing as required.
- D. Apply sealant to achieve watertight assembly.

### 3.4 CLEANING

- A. Remove protective material from prefinished aluminum surfaces.
- B. Wash down exposed surfaces; wipe surfaces clean.

C. Remove excess sealant.

END OF SECTION

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SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
  - a. "Metal Doors and Frames"
  - b. "Aluminum-Framed Entrances and Storefronts"

2.1 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule

2. Recommended Locations for Builders Hardware
  3. Keying Systems and Nomenclature
  4. Installation Guide for Doors and Hardware
- C. NFPA – National Fire Protection Association
1. NFPA 70 – National Electric Code
  2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
  3. NFPA 101 – Life Safety Code
  4. NFPA 105 – Smoke and Draft Control Door Assemblies
  5. NFPA 252 – Fire Tests of Door Assemblies
- D. ANSI - American National Standards Institute
1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
  2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
  3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
  4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
  5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

### 3.1 SUBMITTALS

#### A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
  - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
  - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

#### B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.

- a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
3. Door Hardware Schedule:
    - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
    - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
    - c. Indicate complete designations of each item required for each opening, include:
      - 1) Door Index: door number, heading number, and Architect's hardware set number.
      - 2) Quantity, type, style, function, size, and finish of each hardware item.
      - 3) Name and manufacturer of each item.
      - 4) Fastenings and other pertinent information.
      - 5) Location of each hardware set cross-referenced to indications on Drawings.
      - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
      - 7) Mounting locations for hardware.
      - 8) Door and frame sizes and materials.
      - 9) Degree of door swing and handing.
  4. Key Schedule:
    - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
    - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
    - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
    - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
- C. Informational Submittals:
1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
  2. Provide Product Data:
    - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
    - b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
  - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
  - b. Catalog pages for each product.
  - c. Final approved hardware schedule edited to reflect conditions as installed.
  - d. Final keying schedule
  - e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
  - a. Fire door assemblies, in compliance with NFPA 80.
  - b. Required egress door assemblies, in compliance with NFPA 101.

#### 4.1 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
  - a. For door hardware: DHI certified AHC or DHC.
  - b. Can provide installation and technical data to Architect and other related subcontractors.
  - c. Can inspect and verify components are in working order upon completion of installation.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:

- a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
  - b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
2. Smoke and Draft Control Door Assemblies:
    - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
    - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
  3. Accessibility Requirements:
    - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.
- C. Pre-Installation Meetings
1. Keying Conference
    - a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      - 2) Preliminary key system schematic diagram.
      - 3) Address for delivery of keys.
  2. Pre-installation Conference
    - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - b. Inspect and discuss preparatory work performed by other trades.
    - c. Review required testing, inspecting, and certifying procedures.
    - d. Review questions or concerns related to proper installation and adjustment of door hardware.

## 5.1 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.



- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

## 6.1 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

## 7.1 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
  - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
  - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
    - a. Mechanical Warranty
      - 1) Locks
        - a) Schlage L Series: 3 years
      - 2) Closers
        - a) LCN 4050 Series: 25 years
        - b) LCN 1450 Series: 25 years

## 8.1 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

## PART 2 - PRODUCTS

### 1.1 MANUFACTURERS

- A. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

### 2.1 MATERIALS

#### A. Fabrication

- 1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
  - 2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
  - 3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
    - 1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

### 3.1 HINGES

#### A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product:
  - a. Ives 5BB series
- 2. Acceptable Manufacturers and Products:
  - a. Hager BB1191/1279 series
  - b. McKinney TB series
  - c. Best FBB series

**B. Requirements:**

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
  - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
  - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
  - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
  - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
6. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
  - a. Steel Hinges: Steel pins
  - b. Non-Ferrous Hinges: Stainless steel pins
  - c. Out-Swinging Exterior Doors: Non-removable pins
  - d. Out-Swinging Interior Lockable Doors: Non-removable pins
  - e. Interior Non-lockable Doors: Non-rising pins

**4.1 FLUSH BOLTS****A. Manufacturers:**

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Burns
  - b. DCI
  - c. Trimco
  - d. Don-Jo
  - e. Hager

**B. Requirements:**

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

## 5.1 COORDINATORS

### A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Burns
  - b. DCI
  - c. Trimco
  - d. Don-Jo
  - e. Hager

### B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

## 6.1 MORTISE LOCKS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage L9000 series
2. Acceptable Manufacturers and Products:
  - a. Accurate 9000/9100 series
  - b. Sargent 8200 series

### B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to "KEYING" article, herein.

5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches.
7. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
  - a. Vandlgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.

## 7.1 CYLINDRICAL LOCKS – GRADE 1

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. Schlage ND series
2. Acceptable Manufacturers and Products:
  - a. Sargent 11-Line
  - b. Corbin-Russwin CL3100 series

### B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
  - a. Vandlgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.

## 8.1 CYLINDERS

### A. Manufacturers:

1. Scheduled Manufacturer and Product:
  - a. AS REQUIRED TO MATCH OWNER'S EXISTING

2. Acceptable Manufacturers and Products:

B. Requirements:

1. Provide cylinders/cores to match Owner's existing key system, compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.

9.1 KEYING

A. Scheduled System:

1. Existing factory registered system:
  - a. Provide cylinders/cores keyed into Owner's existing factory registered keying system. Comply with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:
  - a. Replaceable Construction Cores.
    - 1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
      - a) 3 construction control keys
      - b) 12 construction change (day) keys.
    - 2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.
2. Permanent Keying:
  - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
    - 1) Master Keying system as directed by the Owner.
  - b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
  - c. Provide keys with the following features:
    - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
    - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
  - d. Identification:
    - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
    - 2) Identification stamping provisions must be approved by the Architect and Owner.
    - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
    - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
    - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
  - e. Quantity: Furnish in the following quantities.

- 1) Change (Day) Keys: 3 per cylinder/core.
- 2) Permanent Control Keys: 3.
- 3) Master Keys: 6.

## 10.1 DOOR CLOSERS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. LCN 4050A series
2. Acceptable Manufacturers and Products:
  - a. Falcon SC70A series
  - b. Norton 7500 series

### B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
3. Closer Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter heat-treated pinion journal and full complement bearings.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 11.1 DOOR CLOSERS

### A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
  - a. LCN 1450 series
2. Acceptable Manufacturers and Products:
  - a. Falcon SC80A series
  - b. Norton 8000 series

## B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory.
2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
3. Closer Body: 1-3/8-inch (35 mm) diameter with 5/8-inch (16 mm) diameter pinion journal diameter heat-treated pinion journal and full complement bearings.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Pressure Relief Valve (PRV) Technology: Not permitted.
7. Provide stick on and special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

## 12.1 DOOR TRIM

## A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Elmes
  - b. Trimco
  - c. Burns

## B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

## 13.1 PROTECTION PLATES

## A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Burns
  - b. Trimco
  - c. Rockwood



## B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Size plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

## 14.1 DOOR STOPS AND HOLDERS

## A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Trimco
  - b. Burns
  - c. Rockwood

## B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button or thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

## 15.1 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

## A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Zero International
2. Acceptable Manufacturers:
  - a. National Guard
  - b. Reese
  - c. Legacy
  - d. Pemko

## B. Requirements:

1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

## 16.1 SILENCERS

## A. Manufacturers:

1. Scheduled Manufacturer:
  - a. Ives
2. Acceptable Manufacturers:
  - a. Burns
  - b. Rockwood
  - c. Trimco

## B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

## 17.1 FINISHES

## A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match

7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

## PART 3 - EXECUTION

### 1.1 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

### 2.1 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
  1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  2. Custom Steel Doors and Frames: HMMA 831.
  3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
  4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
  - 1. Install construction cores to secure building and areas during construction period.
  - 2. Replace construction cores with permanent cores as indicated in keying section.
- J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- K. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- L. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- M. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- N. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- O. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.1 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

### 4.1 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.

- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

5.1 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.
- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:









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Hardware Group No. 01

For use on Door #(s):

BB101            BB102            BB104            PB102

Provide each door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR
Y					H	
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	CORRIDOR W/DEADBOLT	LV9456L 06A 09-544 L283-722		626	SCH
1	EA	MORTISE CYLINDER	AS REQ TO MATCH EXISTING		626	
1	EA	SURFACE CLOSER	4050A SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
			(PROVIDE ONLY AT OPENINGS WITHOUT COVER)			
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	655A-223		A	ZER









PROVIDE CONDUIT TO HEADER OF FRAME OPENING TO ALLOW FOR FUTURE OWNER PROVIDED ACCESS CONTROL SYSTEM.

## Hardware Group No. 01.1

For use on Door #(s):

SP104            SP105            SP106            SP107

Provide each door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR
Y					H	
3	EA	HINGE	5BB1 4.5 X 4.5		630	IVE
1	EA	CORRIDOR W/DEADBOLT	LV9456L 06A 09-544 L283-722		626	SCH
1	EA	MORTISE CYLINDER	AS REQ TO MATCH EXISTING		626	
1	EA	SURFACE CLOSER	4050A REG OR PA AS REQ		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	WALL STOP	WS406/407CCV		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	655A-223		A	ZER









PROVIDE CONDUIT TO HEADER OF FRAME OPENING TO ALLOW FOR FUTURE OWNER PROVIDED ACCESS CONTROL SYSTEM.

## Hardware Group No. 02

For use on Door #(s):

BB103            PB104            PB105            PB106

Provide each door(s) with the following:









QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR
Y					H	
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	L9080L 06A		626	SCH
1	EA	MORTISE CYLINDER	AS REQ TO MATCH EXISTING		626	
1	EA	SURFACE CLOSER	4050A SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	655A-223		A	ZER

## Hardware Group No. 03

For use on Door #(s):

MB100A MB100B

Provide each door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR
Y					H	
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	CORRIDOR LOCK	L9456L 06A 09-544		626	SCH
1	EA	MORTISE CYLINDER	AS REQ TO MATCH EXISTING		626	
1	EA	SURFACE CLOSER	4050A SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA		AA	ZER
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	655A-223		A	ZER

## Hardware Group No. 04

For use on Door #(s):

MB100C MB100D

Provide each door(s) with the following:





QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR
Y					H	
1			HARDWARE BY MANUFACTURER			

## Hardware Group No. 05

For use on Door #(s):

MB101

Provide each door(s) with the following:






QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR
Y					H	
3	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	PRIVACY LOCK	ND40S RHO		626	SCH
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64/65 AS REQ		GRY	IVE

## Hardware Group No. 06

For use on Door #(s):

MB102

Provide each door(s) with the following:






QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR
Y					H	
3	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	CLASSROOM LOCK	ND70TD RHO		626	SCH
1	EA	FSIC CORE	23-030 EV29 S		626	SCH
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64/65 AS REQ		GRY	IVE

## Hardware Group No. 07

For use on Door #(s):

MB103

Provide each door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR
Y					H	
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	STOREROOM LOCK	ND80TD RHO		626	SCH
1	EA	FSIC CORE	23-030 EV29 S		626	SCH
1	EA	WALL STOP	WS406/407CCV		630	IVE
3	EA	SILENCER	SR64/65 AS REQ		GRY	IVE












## Hardware Group No. 08

For use on Door #(s):

PB101 PB103

Provide each door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR
Y					H	
3	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	CLASSROOM DEADBOLT	B563L		626	SCH
1	EA	MORTISE CYLINDER	AS REQ TO MATCH EXISTING		626	
1	EA	PUSH PLATE	8200 4" X 16"		630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"		630	IVE
1	EA	SURFACE CLOSER	4050A SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	655A-223		A	ZER












PROVIDE CONDUIT TO HEADER OF FRAME OPENING TO ALLOW FOR FUTURE OWNER PROVIDED ACCESS CONTROL SYSTEM.

## Hardware Group No. 09

For use on Door #(s):

SP101 SP102

Provide each door(s) with the following:







QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR
Y					H	
8	EA	HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	SET	CONST LATCHING BOLT	FB51P		630	IVE
1	EA	DUST PROOF STRIKE	DP2		626	IVE
1	EA	STOREROOM LOCK	L9080L 06A		626	SCH
1	EA	MORTISE CYLINDER	AS REQ TO MATCH EXISTING		626	
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	SURFACE CLOSER	4050A SHCUSH		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER
2	SET	MEETING STILE	328AA-S		AA	ZER
2	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	655A-223		A	ZER

Hardware Group No. 10

For use on Door #(s):

SP103

Provide each door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR
Y					H	
3	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	STOREROOM LOCK	ND80TD RHO		626	SCH
1	EA	FSIC CORE	23-030 EV29 S		626	SCH
1	EA	SURFACE CLOSER	1450 SCUSH STD		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER

END OF SECTION

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## SECTION 088000 - GLAZING

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing compounds.

## 1.2 RELATED REQUIREMENTS

- A. Section 072500 - Weather Barriers.
- B. Section 072700 - Air Barriers.
- C. Section 079200 - Joint Sealants: Sealants for other than glazing purposes.
- D. Section 084313 - Aluminum-Framed Storefronts: Glazing provided as part of storefront assembly.

## 1.3 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2019).
- C. ASTM C1036 - Standard Specification for Flat Glass 2021.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- E. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- F. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass 2021a.
- G. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings 2016.
- H. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation 2019.
- I. GANA (SM) - GANA Sealant Manual 2008.
- J. NFRC 100 - Procedure for Determining Fenestration Product U-factors 2020.
- K. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence 2020.

- L. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems 2023.

#### 1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data on Insulating Glass 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 sample of glass units.
- E. Samples: Submit 2 inch long bead of glazing sealant, color as selected.
- F. Certificate: Certify that products of this section meet or exceed specified requirements.
- G. Manufacturer's qualification statement.
- H. Installer's qualification statement.
- I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.
  - 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
    - a. Insulating Glass Certification Council (IGCC).
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years experience.

#### 1.6 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

## 1.7 WARRANTY

- A. See Section 017830 - Warranties and Bonds, 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

### 2.1 MANUFACTURERS

- A. Glass Fabricators:
  - 1. GGI - General Glass International: [www.generalglass.com/#sle](http://www.generalglass.com/#sle).
  - 2. Tecnoglass: [www.tecnoglass.com/#sle](http://www.tecnoglass.com/#sle).
  - 3. Viracon, Inc: [www.viracon.com/#sle](http://www.viracon.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Float Glass Manufacturers:
  - 1. Cardinal Glass Industries: [www.cardinalcorp.com/#sle](http://www.cardinalcorp.com/#sle).
  - 2. Guardian Glass, LLC: [www.guardianglass.com/#sle](http://www.guardianglass.com/#sle).
  - 3. Pilkington North America Inc: [www.pilkington.com/na/#sle](http://www.pilkington.com/na/#sle).
  - 4. Saint Gobain North America: [www.saint-gobain.com/#sle](http://www.saint-gobain.com/#sle).
  - 5. Vitro Architectural Glass (formerly PPG Glass): [www.vitroglazings.com/#sle](http://www.vitroglazings.com/#sle).
  - 6. Substitutions: See Section 016000 - Product Requirements.

### 2.2 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.

## 2.3 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. Tinted Type: ASTM C1036, Class 2 - Tinted, Quality - Q3, with color and performance characteristics as indicated.
  - 4. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

## 2.4 INSULATING GLASS UNITS

- A. Manufacturers:
  - 1. Cardinal Glass Industries: [www.cardinalcorp.com/#sle](http://www.cardinalcorp.com/#sle).
  - 2. Guardian Glass, LLC: SNR 50: [www.guardianglass.com/#sle](http://www.guardianglass.com/#sle). Basis of Design.
  - 3. Pilkington North America Inc: [www.pilkington.com/na/#sle](http://www.pilkington.com/na/#sle). Pilkington North America Inc : [www.pilkington.com/na/#sle](http://www.pilkington.com/na/#sle).
  - 4. Viracon, Apogee Enterprises, Inc: [www.viracon.com/#sle](http://www.viracon.com/#sle).
  - 5. Vitro Architectural Glass (formerly PPG Glass): [www.vitroglazings.com/#sle](http://www.vitroglazings.com/#sle).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Fabricator: Certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.

## C. Insulating Glass Units: Types as indicated.

1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
3. Metal-Edge Spacers: Aluminum, bent and soldered corners.
4. Spacer Color: Black.
5. 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.
  - b. Color: Black.
6. Purge interpane space with dry air, hermetically sealed.

## D. Insulating Glass Units: Vision glass, double glazed.

1. Applications: Exterior glazing unless otherwise indicated.
2. Space between lites filled with argon.
3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
  - a. Tint: Crystal Gray.
  - b. Coating: Low-E (passive type), on #2 surface.
4. Metal edge spacer.
5. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
  - a. Tint: Clear.
6. Total Thickness: 1 inch.
7. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.214, nominal.
8. Visible Light Transmittance (VLT): 34 percent, nominal.
9. Shading Coefficient: 0.23, nominal.
10. Solar Heat Gain Coefficient (SHGC): 0.20, nominal.
11. Visible Light Reflectance, Outside: 15 percent, nominal.



12. Glazing Method: Dry glazing method, gasket glazing.

E. Insulating Glass Units: Spandrel glazing.

1. Applications: Exterior spandrel glazing unless otherwise indicated.

2. Space between lites filled with air.

3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.

a. Tint: Crystal Gray.

b. Coating: Same as on vision units, on #2 surface.

4. Inboard Lite: Fully tempered float glass, 1/4 inch thick.

a. Tint: Clear.

b. Opacifier: Ceramic frit, on #4 surface.

c. Opacifier Color: Gray.

5. Total Thickness: 1 inch.

6. Thermal Transmittance (U-Value), Summer - Center of Glass: 0.214, nominal.

7. Visible Light Reflectance, Outside: 15 percent, nominal.

8. Glazing Method: Dry glazing method, gasket glazing.

## 2.5 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 of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch 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 II. Minimum 3 inch long by one half the height of the glazing stop by 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 II; color black.

## 2.6 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

## PART 3 EXECUTION

### 3.1 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 the minimum required face and edge clearances are being provided.
- C. 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.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

### 3.2 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.

### 3.3 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. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

### 3.4 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 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.

### 3.5 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 Substantial Completion in accordance with glass manufacturer's written recommendations.

### 3.6 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 Substantial Completion.

END OF SECTION

SECTION 089100 - LOUVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Louvers, frames, and accessories.

1.2 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 084313 - Aluminum-Framed Storefronts: Prepared openings for louvers.
- C. Section 099113 - Exterior Painting: Field painting.

1.3 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. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices 2021.

1.4 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.
- C. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, and tolerances; head, jamb and sill details; blade configuration, screens, blank-off areas required, and frames.
- D. Test Reports: Independent agency reports showing compliance with specified performance criteria.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

## 1.6 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Provide five year manufacturer's warranty against distortion, metal degradation, and connection failures of louver components.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Louvers:
  - 1. Airolite Company, LLC: [www.airolite.com/#sle](http://www.airolite.com/#sle).
  - 2. Construction Specialties, Inc: [www.c-sgroup.com/#sle](http://www.c-sgroup.com/#sle).
  - 3. Ruskin Company: [www.ruskin.com/#sle](http://www.ruskin.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.

### 2.2 LOUVERS

- A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.
  - 1. Wind Load Resistance: Design to resist positive and negative wind load as required by code without damage or permanent deformation.
  - 2. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
  - 3. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.
- B. Stationary Louvers: Horizontal blade, extruded aluminum construction, with intermediate mullions matching frame.
  - 1. Free Area: 50 percent, minimum.
  - 2. Blades: Sightproof with drainable edge design.
  - 3. Frame: 4 inches deep, channel profile; corner joints mitered and , with continuous recessed caulking channel each side.
  - 4. Aluminum Thickness: Frame 12 gauge, 0.0808 inch minimum; blades 12 gauge, 0.0808 inch minimum.
  - 5. Aluminum Finish: Superior performing organic coatings; finish welded units after fabrication.

- C. Curtain Wall Glazing Louvers: Horizontal blade, extruded aluminum construction with glazing frame welded or mechanically fastened onto louver.
  - 1. Free Area: 50 percent, minimum.
  - 2. Blades: Sightproof with drainable edge design.
  - 3. Frame: 1-1/4 inch deep, channel profile; corner joints mitered, with continuous recessed caulking channel.
  - 4. Aluminum Thickness: Frame 14 gauge, 0.0641 inch minimum; blades 14 gauge, 0.0641 inch minimum.
  - 5. Aluminum Finish: Superior performing organic coatings; finish welded units after fabrication.

## 2.3 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).

## 2.4 FINISHES

- A. Superior Performing Organic Coatings 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 aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.
  - 1. Manufacturers:
    - a. PPG; Duranar: [www.ppgmetalcoatings.com/#sle](http://www.ppgmetalcoatings.com/#sle).
    - b. Sherwin-Williams Company; Fluoropon: [www.coil.sherwin.com/#sle](http://www.coil.sherwin.com/#sle).
    - c. Substitutions: See Section 016000 - Product Requirements.
- B. Primer: Zinc chromate, alkyd type.
- C. Color: As indicated on drawings.

## 2.5 ACCESSORIES

- A. Blank-Off Panels: Aluminum face and back sheets, polyisocyanurate foam core, 1-1/2 inch thick, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.
- B. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.
- C. Insect Screen: aluminum mesh.

- D. Fasteners and Anchors: Stainless steel.
- E. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.
- F. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.
- B. Verify that field measurements are as indicated.

#### 3.2 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Install louvers level and plumb.
- C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- D. Secure louver frames in openings with concealed fasteners.
- E. Coordinate with installation of mechanical ductwork.

#### 3.3 CLEANING

- A. Strip protective finish coverings.
- B. Clean surfaces and components.

END OF SECTION

## SECTION 092116 - GYPSUM BOARD ASSEMBLIES

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Acoustic insulation.
- E. Gypsum wallboard.
- F. Joint treatment and accessories.

## 1.2 RELATED REQUIREMENTS

- A. Section 054000 - Cold-Formed Metal Framing: Structural steel stud framing.
- B. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 072100 - Thermal Insulation: Acoustic insulation.
- D. Section 079200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

## 1.3 REFERENCE STANDARDS

- A. AISI S201 - North American Standard for Cold-Formed Steel Framing - Product Data 2017.
- B. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing 2020.
- C. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing 2015, with Errata (2020).
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- 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 C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017 (Reapproved 2022).
- H. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- I. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2020.
- J. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2020.
- K. 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.
- L. 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.
- M. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base 2019.
- N. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing 2017.
- O. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing 2018.
- P. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.
- Q. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels 2019, with Editorial Revision (2020).
- R. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2021.
- S. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- T. ASTM E413 - Classification for Rating Sound Insulation 2022.
- U. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).
- V. GA-216 - Application and Finishing of Gypsum Panel Products 2021.
- W. GA-600 - Fire Resistance and Sound Control Design Manual 2021.

#### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the installation of gypsum board assemblies with size, location, and installation of service utilities.

## 1.5 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data:
  - 1. Provide data on metal framing, gypsum board, accessories, and joint finishing system.

## 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Member of Steel Stud Manufacturers Association (SSMA): [www.ssmma.com/#sle](http://www.ssmma.com/#sle).

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.
- B. Store metal products to prevent corrosion.

## PART 2 PRODUCTS

### 2.1 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
  - 1. See PART 3 for finishing requirements.
- B. Interior Partitions: Provide completed assemblies with the following characteristics:
  - 1. Acoustic Attenuation: STC of 45-49 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 Ceilings and Soffits: One (1) hour fire rating.

### 2.2 METAL FRAMING MATERIALS

- A. Material and Product Requirements Criteria: AISI S201.
- B. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S220 or equivalent.
  - 1. Structural Grade: As required to meet design criteria.
  - 2. Corrosion Protection Coating Designation: G40, or equivalent in accordance with AISI S220.

- C. Manufacturers - Metal Framing, Connectors, and Accessories:
1. ClarkDietrich: [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
  2. Jaimes Industries: [www.jaimesind.com/#sle](http://www.jaimesind.com/#sle).
  3. MarinoWARE: [www.marinoware.com/#sle](http://www.marinoware.com/#sle).
  4. Steel Construction Systems: [www.steelconsystems.com/#sle](http://www.steelconsystems.com/#sle).
  5. Substitutions: See Section 016000 - Product Requirements.
- D. Nonstructural Framing System Components: AISI S220; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
1. Studs: C-shaped with knurled or embossed faces.
    - a. Products:
      - 1) MBA Building Supplies; ProSTUD: [www.mbastuds.com/#sle](http://www.mbastuds.com/#sle).
      - 2) R-stud; R-stud: [www.rstud.com/#sle](http://www.rstud.com/#sle).
      - 3) Super Stud Building Products, Inc; The EDGE: [www.buysuperstud.com/#sle](http://www.buysuperstud.com/#sle).
      - 4) Substitutions: See Section 016000 - Product Requirements.
    2. Runners: U shaped, sized to match studs.
    3. Ceiling Channels: C-shaped.
    4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
    5. Furring Members: U-shaped sections, minimum depth of 3/4 inch.
    6. Furring Members: Zee-shaped sections, minimum depth of 1 inch.
    7. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
- E. Shaft Wall Studs and Accessories: AISI S220; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
1. Products:
    - a. Same manufacturer as other framing materials.
- F. 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.
- G. Non-structural Framing Accessories:

1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
2. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
3. Drywall Corner Clips: Drywall clips help support drywall to reduce wood blocking on top plates, end walls, and corners.

## 2.3 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. Gold Bond Building Products, LLC provided by National Gypsum Company; \_\_\_\_: [www.goldbondbuilding.com/#sle](http://www.goldbondbuilding.com/#sle).
5. USG Corporation: [www.usg.com/#sle](http://www.usg.com/#sle).
6. Substitutions: See Section 016000 - 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.
  - a. Mold resistant board is required at all locations.
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.
  - b. Ceilings: As required by UL Assembly for rated construction, 1/2 inch at all other locations.
  - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
5. Mold-Resistant, Paper-Faced Products:
  - a. American Gypsum Company; M-Bloc Type X: [www.americangypsum.com/#sle](http://www.americangypsum.com/#sle).
  - b. American Gypsum Company; M-Bloc Type C: [www.americangypsum.com/#sle](http://www.americangypsum.com/#sle).

- c. CertainTeed Corporation; M2Tech 5/8" Type X Moisture & Mold Resistant Drywall: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - d. Georgia-Pacific Gypsum; Tough Rock Fireguard X Mold-Guard: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
  - e. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Gypsum Board: [www.goldbondbuilding.com/#sle](http://www.goldbondbuilding.com/#sle).
  - f. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond XP Fire-Shield Gypsum Board: [www.goldbondbuilding.com/#sle](http://www.goldbondbuilding.com/#sle).
  - g. USG Corporation; Sheetrock Brand Mold Tough Firecode SCX Panels 5/8 in. (15.9 mm): [www.usg.com/#sle](http://www.usg.com/#sle).
  - h. Substitutions: See Section 016000 - Product Requirements.
6. Glass Mat Faced Products:
- a. CertainTeed Corporation; 5/8" GlasRoc Interior Type X: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - b. Georgia-Pacific Gypsum; DensArmor Plus Fireguard C: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
  - c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Interior Extreme Fire-Shield Gypsum Panel: [www.goldbondbuilding.com/#sle](http://www.goldbondbuilding.com/#sle).
  - d. USG Corporation; Sheetrock Brand Glass-Mat Panels Mold Tough Regular 5/8 in. (15.9 mm): [www.usg.com/#sle](http://www.usg.com/#sle).
  - e. Substitutions: See Section 016000 - Product Requirements.
- C. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings, unless otherwise indicated.
  2. Thickness: As required by UL Assemblies in rated construction, 1/2 inch at all other locations.
  3. Edges: Tapered.
  4. Products:
    - a. CertainTeed Corporation; 1/2" Easi-Lite: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
    - b. Georgia-Pacific Gypsum; Tough Rock Span 24 Ceiling Board: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
    - c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond High Strength LITE Gypsum Board: [www.goldbondbuilding.com/#sle](http://www.goldbondbuilding.com/#sle).
    - d. USG Corporation; Sheetrock Brand UltraLight Panels 1/2 in. (12.7 mm): [www.usg.com/#sle](http://www.usg.com/#sle).

- e. Substitutions: See Section 016000 - Product Requirements.
- D. Exterior Sheathing Board: See Section 054000.
- E. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
  - 1. Application: Exterior sheathing, unless otherwise indicated.
  - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  - 3. Fungal Resistance: No fungal growth when tested in accordance with ASTM G21.
  - 4. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
  - 5. 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.
  - 6. Type X Thickness: 5/8 inch.
  - 7. Edges: Square.
  - 8. Glass Mat Faced Products:
    - a. American Gypsum Company; M-Glass Exterior Sheathing Type X: [www.americangypsum.com/#sle](http://www.americangypsum.com/#sle).
    - b. CertainTeed Corporation; GlasRoc Type X Exterior Sheathing: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
    - c. Georgia-Pacific Gypsum; DensGlass Fireguard Sheathing: [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
    - d. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Fire-Shield Sheathing: [www.goldbondbuilding.com/#sle](http://www.goldbondbuilding.com/#sle).
    - e. USG Corporation; Securock Brand UltraLight Glass-Mat Sheathing Firecode X 5/8 in. (15.9 mm): [www.usg.com/#sle](http://www.usg.com/#sle).
    - f. Substitutions: See Section 016000 - Product Requirements.
- F. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
  - 1. Glass Mat Faced Type: Glass mat shaftliner gypsum panel or glass mat coreboard gypsum panel as defined in ASTM C1658/C1658M.
  - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  - 3. Glass Mat Faced Products:
    - a. American Gypsum Company; M-Glass Shaft Liner: [www.americangypsum.com/#sle](http://www.americangypsum.com/#sle).

- b. CertainTeed Corporation; GlasRoc Shaftliner Type X: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
- c. Georgia-Pacific Gypsum; DensGlass Shaftliner (mold-resistant): [www.gpgypsum.com/#sle](http://www.gpgypsum.com/#sle).
- d. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Shaftliner: [www.goldbondbuilding.com/#sle](http://www.goldbondbuilding.com/#sle).
- e. USG Corporation; Sheetrock Brand Glass-Mat Liner Panels Mold Tough 1 in. (25.4 mm): [www.usg.com/#sle](http://www.usg.com/#sle).
- f. Substitutions: See Section 016000 - Product Requirements.

## 2.4 GYPSUM BOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed mineral-fiber, friction fit type, unfaced; thickness as required for STC.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- C. Air Barrier: See Section 072700.
- D. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
  - 1. Corner Beads: Low profile, for 90 degree outside corners.
    - a. Products:
      - 1) CertainTeed Corporation; No-Coat Drywall Corner: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
      - 2) ClarkDietrich; Strait-Flex OS-300: [www.clarkdietrich.com/#sle](http://www.clarkdietrich.com/#sle).
      - 3) Phillips Manufacturing Co; Everlast Corner Bead: [www.phillipsmfg.com/#sle](http://www.phillipsmfg.com/#sle).
      - 4) Substitutions: See Section 016000 - Product Requirements.
    - 2. Expansion Joints:
      - a. Type: V-shaped metal with factory-installed protective tape.
- E. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
  - 1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners.
  - 2. Joint Compound: Drying type, vinyl-based, ready-mixed.
  - 3. Joint Compound: Setting type, field-mixed.

- F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- G. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

#### 3.2 SHAFT WALL INSTALLATION

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
  - 1. Install studs at spacing required to meet performance requirements.
- B. Shaft Wall Liner: Cut panels to accurate dimensions and install sequentially between special friction studs.
  - 1. Seal perimeter of shaft wall and penetrations with acoustical sealant.

#### 3.3 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C1007/AISI S220 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
  - 1. Level ceiling system to a tolerance of 1/1200.
  - 2. Laterally brace entire suspension system.
- C. Studs: Space studs at 16 inches on center.
  - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
  - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
  - 3. 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 with continuous bridging.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.



- E. Standard Wall Furring: Install at masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.
- F. Furring for Fire-Resistance Ratings: Install as required for fire-resistance ratings indicated and to GA-600 requirements.
- G. Blocking: Install wood blocking for support of:
  - 1. Framed openings.
  - 2. Wall-mounted cabinets.
  - 3. Plumbing fixtures.
  - 4. Toilet partitions.
  - 5. Toilet accessories.
  - 6. Wall-mounted door hardware.

### 3.4 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. Acoustic Sealant: Install in accordance with manufacturer's instructions.
  - 1. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

### 3.5 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. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.
- F. 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.
- G. Installation on Metal Framing: Use screws for attachment of gypsum board.

### 3.6 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as follows:
  - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
  - 2. At exterior soffits, not more than 30 feet apart in both directions.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

### 3.7 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
- B. Paper Faced Gypsum Board: Use fiberglass joint tape, embed with drying type joint compound and finish with drying type joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  - 1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
  - 2. Level 4: Walls and ceilings to receive 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.
- D. 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.
  - 2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.

3. Taping, filling, and sanding are not required at base layer of double-layer applications.

E. 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.

F. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

### 3.8 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

### 3.9 PROTECTION

A. Protect installed gypsum board assemblies from subsequent construction operations.

END OF SECTION

## SECTION 095100 - ACOUSTICAL CEILINGS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

## 1.2 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- C. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings 2022.
- D. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels 2019.
- E. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions 2022.
- F. ASTM E1264 - Standard Classification for Acoustical Ceiling Products 2022.

## 1.3 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.

## 1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.

## 1.5 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.

## 1.6 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

## PART 2 PRODUCTS

### 2.1 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/ceilings/#sle](http://www.usg.com/ceilings/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Suspension Systems:
  - 1. Same as for acoustical units.
  - 2. Substitutions: See Section 016000 - Product Requirements.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Ceiling systems designed to withstand the effects of earthquake motions determined according to ASCE 7 for Seismic Design Category D, E, or F and complying with the following:
  - 1. Local authorities having jurisdiction.

### 2.3 ACOUSTICAL UNITS

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. Acoustical Tiles: Painted mineral fiber, with the following characteristics:

1. Classification: ASTM E1264 Type III.
  - a. Form: 2, water felted.
  - b. Pattern: "D" - fissured.
2. Size: 24 by 24 inches.
3. Thickness: 3/4 inch.
4. Tile Edge: Square.
  - a. Joint: Square Edge.
5. Color: White.
6. Suspension System: Concealed.
7. Products:
  - a. Armstrong World Industries, Inc; Fine Fissured: [www.armstrongceilings.com/#sle](http://www.armstrongceilings.com/#sle).
  - b. Certainteed Architectural; Cashmere: [www.certainteed.com/ceilings-and-walls/#sle](http://www.certainteed.com/ceilings-and-walls/#sle).
  - c. USG Corporation; Eclipse Acoustical Panels: [www.usg.com/ceilings/#sle](http://www.usg.com/ceilings/#sle).
  - d. Substitutions: See Section 016000 - Product Requirements.

#### 2.4 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.
  1. Materials:
    - a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
- C. Exposed Suspension System: Hot-dipped galvanized steel grid with steel cap.
  1. Application(s): Seismic.
  2. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
  3. Profile: Tee; 15/16 inch face width.
  4. Finish: Baked enamel.

5. Color: White.
6. Products:
  - a. Certainteed Architectural; 15/16" EZ Stab Classic System: [www.certainteed.com/ceilings-and-walls/#sle](http://www.certainteed.com/ceilings-and-walls/#sle).
  - b. USG Corporation; Donn Brand ZXLA 15/16 inch Acoustical Suspension System: [www.usg.com/ceilings/#sle](http://www.usg.com/ceilings/#sle).
  - c. Armstrong; Prelude 15/16" Exposed Tee System: [www.armstrongceilings.com/#sle..](http://www.armstrongceilings.com/#sle..)
  - d. Substitutions: See Section 016000 - Product Requirements.

## 2.5 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 galvanized steel wire.
- C. Hold-Down Clips: Manufacturer's standard clips to suit application.
- D. Seismic Clips: Manufacturer's standard clips for seismic conditions and to suit application.
- E. 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.
- F. Gypsum Board: Fire rated type; 5/8 inch thick, ends and edges square, paper faced.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

### 3.2 PREPARATION

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.

### 3.3 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, 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 plan.
- D. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
  - 1. Install in bed of acoustical sealant.
  - 2. 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. Seismic Suspension System, Seismic Design Category C: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Maintain a 3/8 inch clearance between grid ends and wall.
- G. Seismic Suspension System, Seismic Design Categories D, E, F: Hang suspension system with grid ends attached to the perimeter molding on two adjacent walls; on opposite walls, maintain a 3/4 inch clearance between grid ends and wall.
- H. 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.
- I. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- J. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- K. Do not eccentrically load system or induce rotation of runners.
- L. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with fire rated assembly requirements and light fixture ventilation requirements.

### 3.4 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.



D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:

1. Make field cut edges of same profile as factory edges.

### 3.5 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

### 3.6 CLEANING

A. Clean surfaces.

B. Replace damaged or abraded components.

END OF SECTION

## SECTION 096500 - RESILIENT FLOORING

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

## 1.2 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.

## 1.3 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2022.
- B. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile 2004 (Reapproved 2018).
- C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride 2022.
- D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes 2019a.

## 1.4 SUBMITTALS

- A. See Section 013300 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. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 - Product Requirements, for additional provisions.
2. Extra Flooring Material: 12 square feet of each type and color.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years experience.

#### 1.6 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 and 90 degrees F.
- D. Do not double stack pallets.

#### 1.7 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 to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

### PART 2 PRODUCTS

#### 2.1 TILE FLOORING

- A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
  1. Manufacturers:
    - a. Armstrong Flooring; Standard Execelon Imperial  
Texture: [www.armstrongflooring.com/#sle](http://www.armstrongflooring.com/#sle).
    - b. Johnsonite, a Tarkett Company: [www.johnsonite.com/#sle](http://www.johnsonite.com/#sle).
    - c. Substitutions: See Section 016000 - Product Requirements.
  2. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
  3. Size: 12 by 12 inch.

4. Thickness: 0.125 inch.
5. Color: To be selected by Architect from manufacturer's full range.

## 2.2 RESILIENT BASE

## 2.3 ACCESSORIES

- A. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- B. Adhesive for Vinyl Flooring:
  1. Manufacturers:
    - a. H.B. Fuller Construction Products, Inc; TEC Flexera HT - High Tack Premium Universal PSA Adhesive: [www.tecspecialty.com/#sle](http://www.tecspecialty.com/#sle).
    - b. Loba-Wakol, LLC; WAKOL D 3120 PVC Adhesive: [www.loba-wakol.com/#sle](http://www.loba-wakol.com/#sle).
    - c. Stauf USA, LLC; D737 High-Tack: [www.staufusa.com/#sle](http://www.staufusa.com/#sle).
- C. Sealer and Wax: Types recommended by flooring manufacturer.

## PART 3 EXECUTION

### 3.1 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 moisture and alkalinity (pH).
  1. Test as Follows:
    - a. Alkalinity (pH): ASTM F710.
    - b. Internal Relative Humidity: ASTM F2170.
    - c. Moisture Vapor Emission: ASTM F1869.
  2. 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.

### 3.2 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Prohibit traffic until filler is fully cured.
- C. Clean substrate.

### 3.3 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
  - 1. Resilient Strips: Attach to substrate using adhesive.
- D. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

### 3.4 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.

### 3.5 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

### 3.6 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.7 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION

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## SECTION 096700 - FLUID-APPLIED FLOORING

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Fluid-applied flooring and base.

## 1.2 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Sealing joints between fluid-applied flooring and adjacent construction and fixtures.

## 1.3 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2022.
- B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride 2022.
- C. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes 2019a.

## 1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.
- C. Samples: Submit two samples, 6 by 6 inch in size illustrating color and pattern for each floor material for each color specified.
- D. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- E. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and application rate for each coat.
- F. Manufacturer's Qualification Statement.
- G. Applicator's Qualification Statement.
- H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, procedures for stain removal, repairing surface, and suggested schedule for cleaning.



1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section.
  - 1. Approved by manufacturer.

1.6 MOCK-UPS

- A. Construct mock-up(s) of fluid applied flooring to serve as basis for evaluation of texture and workmanship.
  - 1. Number of Mock-Ups to be Prepared: One.
  - 2. Use same materials and methods for use in the work.
  - 3. Locate where directed.
  - 4. Minimum Size: 48 inches by 48 inches.
- B. Obtain approval of mock-up by Architect before proceeding with work.
- C. Approved mock-up may remain as part of the work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store resin materials in a dry, secure area.
- B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.8 FIELD CONDITIONS

- A. Maintain minimum temperature in storage area of 55 degrees F.
- B. Store materials in area of installation for minimum period of 24 hours prior to installation.
- C. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Fluid-Applied Flooring:

1. Key Resin Company: [www.keyresin.com/#sle](http://www.keyresin.com/#sle).
2. Sherwin-Williams Company: [www.protective.sherwin-williams.com/#sle](http://www.protective.sherwin-williams.com/#sle).
3. Sika Corporation: [www.sikafloorusa.com/#sle](http://www.sikafloorusa.com/#sle).

## 2.2 FLUID-APPLIED FLOORING SYSTEMS

- A. Fluid-Applied Flooring: Epoxy base coat(s), with broadcast aggregate.
1. Aggregate: Quartz granules.
  2. Top Coat: Polyurethane.
  3. System Thickness: 1/8 inch, nominal, dry film thickness (DFT).
  4. Texture: Slip resistant.
  5. Color: As selected by Architect.
  6. Products:
    - a. Key Resin Company; Key Mortar SLT System: [www.keyresin.com/#sle](http://www.keyresin.com/#sle).
    - b. Sherwin-Williams Company; Armorseal Armorquartz 100% Solids Epoxy: [www.protective.sherwin-williams.com/#sle](http://www.protective.sherwin-williams.com/#sle).
    - c. Sika Corporation; Sikafloor Quartzite Broadcast System: [www.sikafloorusa.com/#sle](http://www.sikafloorusa.com/#sle).
    - d. Stonhard; Stonshield SLT: [www.stonhard.com/#sle](http://www.stonhard.com/#sle).

## 2.3 ACCESSORIES

- A. Base Caps: Zinc with projecting base of 1/8 inch; color as selected.
- B. Cant Strips: Molded of flooring resin material.
- C. Subfloor Filler: Type recommended by fluid-applied flooring manufacturer.
- D. Primer: Type recommended by fluid-applied flooring manufacturer.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring.

- 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 flooring.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for fluid-applied flooring installation by testing for moisture and alkalinity (pH).
  - 1. Test as Follows:
    - a. Alkalinity (pH): ASTM F710.
    - b. Internal Relative Humidity: ASTM F2170.
    - c. Moisture Vapor Emission: ASTM F1869.
  - 2. Obtain instructions if test results are not within limits recommended by fluid-applied flooring manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

### 3.2 PREPARATION

- A. Remove subfloor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.
- D. Apply primer to surfaces required by flooring manufacturer.

### 3.3 INSTALLATION - ACCESSORIES

- A. Install cant strips at base of walls where flooring is to be extended up wall as base.
- B. Install terminating cap strip at top of base; attach securely to wall substrate.

### 3.4 INSTALLATION - FLOORING

- A. Apply in accordance with manufacturer's instructions.
- B. Apply each coat to minimum thickness required by manufacturer.
- C. Finish to smooth level surface.
- D. Cove at vertical surfaces.

3.5 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.

3.6 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. Barricade area to protect flooring until fully cured.

END OF SECTION

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SECTION 099113 - EXTERIOR PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
  - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
  - 2. Exposed surfaces of steel lintels and ledge angles.
  - 3. Concrete pavement and retaining walls.
- 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. Non-metallic roofing and flashing.
  - 6. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
  - 7. Floors, unless specifically indicated.
  - 8. Glass.
  - 9. Concealed pipes, ducts, and conduits.

1.2 RELATED REQUIREMENTS

- A. Section 099123 - Interior Painting.

### 1.3 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.
- B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- D. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- E. SSPC-SP 2 - Hand Tool Cleaning 2018.
- F. SSPC-SP 6 - Commercial Blast Cleaning 2007.
- G. SSPC-SP 13 - Surface Preparation of Concrete 2018.

### 1.4 SUBMITTALS

- A. See Section 013300 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.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.
  - 2. Allow 30 days for approval process, after receipt of complete samples by Architect.
  - 3. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, have been approved.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- 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.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 016000 - Product Requirements, for additional provisions.
2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
3. Label each container with color in addition to the manufacturer's label.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.7 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 for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.



- B. Paints:
  - 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).
- C. Primer Sealers: Same manufacturer as top coats.

## 2.2 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. Supply each paint material in quantity required to complete entire project's work from a single production run.
  - 3. 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. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- D. Colors: As indicated on drawings.
  - 1. Final selection to be made by Architect after award of contract.

## 2.3 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including primed wood and primed metal.
  - 1. Two top coats and one coat primer.

2. Top Coat(s): Exterior Latex; MPI #10, 11, 15, 119, or 214.
  - a. Products:
    - 1) Behr Marquee Exterior Semi-Gloss Enamel [No.5450]. (MPI #11)
    - 2) PPG Paints Speedhide Exterior Latex, 6-900XI Series, Semi-Gloss. (MPI #11)
    - 3) Sherwin-Williams Solo Series, Semi-Gloss. (MPI #11)
- B. Paint E-OP-FL - Concrete walkways as indicated on the drawings..
  1. Two top coats and one coat primer/sealer and one top clear coat.
    - a. Basis of Design: Sherwin-Williams Company.
      - 1) 1st Coat: S-W General Polymers 3477 Epoxy Water Emulsion Primer/Sealer, GP3477/GP3477B01.
      - 2) 2nd Coat: S-W Pro Industrial Acrolon 100 Waterbased Urethane Gloss, B65-700 series.
      - 3) 3rd Coat: S-W Pro Industrial Acrolon 100 Waterbased Urethane Gloss, B65-700 series.
      - 4) 4th Coat: S-W Pro industrial Acrolon 100mWaterbased Urethane Gloss, B65T00724 Clear Coat.
      - 5) Substitutions: See Section 016000 - Product Requirements
- C. Paint WE-OP-3L - Wood, Opaque, Latex, 3 Coat:
  1. One coat of latex primer sealer.
  2. Semi-gloss: Two coats of latex enamel.
- D. Paint CE-OP-3L - Masonry/Concrete, Opaque, Latex, 3 Coat:
  1. One coat of block filler.
  2. Flat: Two coats of latex enamel.
- E. Paint ME-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
  1. One coat of latex primer.
  2. Semi-gloss: Two coats of latex enamel.
- F. 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.

G. Paint MgE-OP-3L - Galvanized Metals, Latex, 3 Coat:

1. One coat galvanize primer.
2. Semi-gloss: Two coats of latex enamel.

## 2.4 PRIMERS

A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

1. Alkali Resistant Water Based Primer; MPI #3.
  - a. Products:
    - 1) Behr Premium Plus Interior/Exterior Multi-Surface Primer and Sealer [No.436]. (MPI #3)
    - 2) PPG Paints Series Seal Grip Interior/Exterior Acrylic Universal Primer/Sealer, 17-921XI Series. (MPI #3)
    - 3) Sherwin-Williams Loxon Water Blocking Primer/Finish.
2. Anti-Corrosive Alkyd Primer for Metal; MPI #79.
  - a. Products:
    - 1) PPG Paints Speedhide Rust Inhibitive Primer, 6-212 Series. (MPI #79)
    - 2) Rodda Barrier III HS Metal Primer, 708295. (MPI #79)
    - 3) Substitutions: See Section 016000 - Product Requirements
3. Water Based Primer for Galvanized Metal; MPI #134.
  - a. Products:
    - 1) Behr Premium Plus Interior/Exterior Multi-Surface Primer and Sealer [No.436]. (MPI #134)
    - 2) PPG Paints Pitt-Tech Plus EP DTM Industrial Primer, 90-1912. (MPI #134)
    - 3) Sherwin-Williams DTM Primer/Finish (MPI #134)
4. Rust-Inhibitive Water Based Primer; MPI #107.
  - a. Products:

- 1) Behr Premium Plus Interior/Exterior Multi-Surface Primer and Sealer [No.436]. (MPI #107)
  - 2) PPG Paints Pitt-Tech Plus EP DTM Industrial Primer, 90-1908.
  - 3) Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer. (MPI #107)
5. Latex Primer for Exterior Wood; MPI #6.
- a. Products:
    - 1) Behr Premium Plus Interior/Exterior Multi-Surface Primer and Sealer [No.436]. (MPI #6)
    - 2) PPG Paints Seal Grip Interior/Exterior Acrylic Universal Primer/Sealer, 17-921XI Series. (MPI #6)
    - 3) Sherwin-Williams Exterior Latex Primer, B42W8041. (MPI #6)

## 2.5 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

### 3.1 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 affect proper application.
- D. Test shop-applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  1. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
  2. Concrete Floors and Traffic Surfaces: 8 percent.

### 3.2 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. Concrete:
  - 1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
  - 2. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- G. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- 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. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior caulking compound after prime coat has been applied. Back prime concealed surfaces before installation.
- K. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.3 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.
- C. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- F. Apply each coat to uniform appearance.
- G. Sand wood and metal surfaces lightly between coats to achieve required finish.
- H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- I. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.5 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

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## SECTION 099123 - INTERIOR PAINTING

## PART 1 GENERAL

## 1.1 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.
  - 2. Mechanical and Electrical:
    - a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
    - b. In finished areas, paint shop-primed items.
- 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. Marble, granite, slate, and other natural stones.
  - 7. Floors, unless specifically indicated.
  - 8. Ceramic and other tiles.
  - 9. Glass.
  - 10. Acoustical materials, unless specifically indicated.
  - 11. Concealed pipes, ducts, and conduits.



## 1.2 RELATED REQUIREMENTS

- A. Section 099113 - Exterior Painting.

## 1.3 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

## 1.4 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 D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2019.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- E. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- F. SSPC-SP 6 - Commercial Blast Cleaning 2007.

## 1.5 SUBMITTALS

- A. See Section 013300 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.
  - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
  - 1. Where sheen is specified, submit samples in only that sheen.

2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens not required.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
  - 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.
  - G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
    1. See Section 016000 - Product Requirements, for additional provisions.
    2. Extra Paint and Finish Materials: 1 gal of each color; from the same product run, store where directed.
    3. Label each container with color in addition to the manufacturer's label.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified approved by manufacturer.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

#### 1.8 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. Provide lighting level of 80 fc measured mid-height at substrate surface.

## PART 2 PRODUCTS

## 2.1 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
  - 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).
- C. Primer Sealers: Same manufacturer as top coats.

## 2.2 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. Supply each paint material in quantity required to complete entire project's work from a single production run.
  - 3. 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. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- D. Colors: To be selected from manufacturer's full range of available colors.
  - 1. Selection to be made by Architect after award of contract.

2. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling under which they are mounted.
3. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

### 2.3 PAINT SYSTEMS - INTERIOR

A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete masonry units, wood, 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; MPI #138, 139, 140, 141, or 142.
  - a. Products:
    - 1) Behr Dynasty Interior Semi-Gloss Enamel [No.3650]. (MPI #141)
    - 2) PPG Paints Pure Performance Interior Latex, 9-510XI Series, Semi-Gloss. (MPI #141)
    - 3) Sherwin-Williams Pre-Catalyzed Waterbased Epoxy, Semi-Gloss. (MPI #141)
3. Top Coat Sheen:
  - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
4. 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.
  - a. Products:
    - 1) PPG Paints Pure Performance Interior Latex, 9-510XI Series, Semi-Gloss. (MPI #141)
    - 2) Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, Semi-Gloss. (MPI #141)
    - 3) Substitutions: See Section 016000 - Product Requirements

C. Paint I-OP-MD-WC - Medium Duty Vertical and Overhead: Including gypsum board, concrete masonry units, uncoated steel, shop primed steel, and galvanized steel.

1. Two top coats and one coat primer.
  2. Top Coat(s): Interior Epoxy-Modified Latex; MPI #115 or 215.
    - a. Products:
      - 1) PPG Paints Aquapon WB EP Two-Component Waterborne Epoxy Coating, 98E-1/98E-100 Series, Semi-Gloss. (MPI #215)
      - 2) Sherwin-Williams Waterbased Catalyzed Epoxy, Semi-Gloss.
      - 3) Substitutions: See Section 016000 - Product Requirements
- D. Paint WI-OP-3L - Wood, Opaque, Latex, 3 Coat:
1. One coat of latex primer sealer.
  2. Semi-gloss: Two coats of latex enamel.
- E. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
1. One coat of block filler.
  2. Semi-gloss: Two coats of latex enamel.
- F. Paint MI-OP-3L - Ferrous Metals, Unprimed, Latex, 3 Coat:
1. One coat of latex primer.
  2. Semi-gloss: Two coats of latex enamel.
- G. Paint MI-OP-2L - Ferrous Metals, Primed, Latex, 2 Coat:
1. Touch-up with latex primer.
  2. Semi-gloss: Two coats of latex enamel.
- H. Paint MgI-OP-3L - Galvanized Metals, Latex, 3 Coat:
1. One coat galvanize primer.
  2. Semi-gloss: Two coats of latex enamel.
- I. Paint GI-OP-3L - Gypsum Board/Plaster, Latex, 3 Coat:
1. One coat of alkyd primer sealer.
  2. Semi-gloss: Two coats of latex enamel.

## 2.4 PRIMERS

### A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

1. Interior Institutional Low Odor/VOC Primer Sealer; MPI #149.
  - a. Products:
    - 1) PPG Paints Pure Performance Interior Latex Primer, 9-900. (MPI #149)
    - 2) Substitutions: See Section 016000 - Product Requirements
2. Interior/Exterior Latex Block Filler; MPI #4.
  - a. Products:
    - 1) PPG Paints Speedhide Masonry Hi Fill Latex Block Filler, 6-15XI . (MPI #4)
    - 2) Sherwin-Williams Loxon Block Surfacer. (MPI #4)
    - 3) Zinsser by Rust-Oleum Corporation Block Filler 2X High Build Primer for Concrete: [www.rustoleum.com/#sle](http://www.rustoleum.com/#sle). (MPI #4)
    - 4) Substitutions: See Section 016000 - Product Requirements
3. Interior Latex Primer Sealer.
  - a. Products:
    - 1) Behr Premium Plus Interior All-In-One Primer and Sealer [No.75]. (MPI #50)
    - 2) PPG Paints Speedhide Interior Latex Sealer, 6-2. (MPI #50)
    - 3) Rodda Roseal II, 502701. (MPI #50)
4. Interior Drywall Primer Sealer.
  - a. Products:
    - 1) Behr Premium Plus Interior Drywall Primer and Sealer [No.73].
    - 2) Rodda Vapor Block Interior Perm Rated Latex Primer/Sealer, 507901.
    - 3) Vista Paint Corporation; 140 PVA Sealer: [www.vistapaint.com/#sle](http://www.vistapaint.com/#sle).
5. Interior/Exterior Quick Dry Alkyd Primer for Metal; MPI #76.
  - a. Products:
    - 1) PPG Paints Multiprime Multi-Purpose Primer, 4160 Series. (MPI #76)

- 2) Sumter Coatings, Inc. Heavy Duty Inhibitive Primer, 99-Series.
  - 3) Substitutions: See Section 016000 - Product Requirements
6. Interior Water Based Primer for Galvanized Metal; MPI #134 or #134 X-Green.
- a. Products:
    - 1) Behr Premium Plus Interior/Exterior Multi-Surface Primer and Sealer [No.436]. (MPI #134)
    - 2) PPG Paints Pitt-Tech Plus EP DTM Industrial Primer, 90-1912. (MPI #134)
    - 3) Sherwin-Williams DTM Primer/Finish. (MPI #134, #134 X-Green)
7. Latex Primer for Interior Wood; MPI #39.
- a. Products:
    - 1) Behr Premium Plus Interior All-In-One Primer and Sealer [No.75]. (MPI #39)
    - 2) PPG Paints Seal Grip Interior/Exterior Acrylic Universal Primer/Sealer, 17-921XI Series. (MPI #39)
    - 3) Rodda Unique II Primer, 502001. (MPI #39)
    - 4) Substitutions: See Section 016000 - Product Requirements

## 2.5 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

### 3.1 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.

### 3.2 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 repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- 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.
  - 3. Clean surfaces with pressurized water. Use pressure range of 600 to 1,500 psi at 6 to 12 inches. Allow to dry.
- 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.
- 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.
- K. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

### 3.3 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- E. Sand wood and metal surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### 3.4 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

### 3.5 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

## SECTION 099300 - STAINING AND TRANSPARENT FINISHING

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Field application of transparent finishes.

## 1.2 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

## 1.3 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 D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2019.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

## 1.4 SUBMITTALS

- A. See Section 013300 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 catalog number, and general product category.
  - 2. MPI product number (e.g. MPI #33).
  - 3. Manufacturer's installation instructions.
- C. Samples: Submit two samples, illustrating selected sheens for each system. Submit on actual wood substrate to be finished, 6x12 inch in size.
- D. Manufacturer's Instructions: Indicate special surface preparation procedures.
- E. Applicator's Qualification Statement.
- F. Maintenance Data: Submit data including finish schedule showing where each product, color, and 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.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years experience.
- B. Applicator Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

## 1.6 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 and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

## 1.7 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.
- C. Provide lighting level of 80 fc measured mid-height at substrate surface.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Provide finishes used in any individual system from the same manufacturer; no exceptions.
- B. 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. SANSIN: [www.sansin.com](http://www.sansin.com).

## 2.2 STAINS AND TRANSPARENT FINISHES - GENERAL

### A. Finishes:

1. 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.
2. Provide materials 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 finish material in quantity required to complete entire project's work from a single production run.
4. 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.

## 2.3 EXTERIOR STAIN AND TRANSPARENT FINISH SYSTEMS

### A. Finish on Wood - Decking:

1. One coat(s) sealer.
2. Two coat(s) varnish.
3. Top Coat(s): Exterior Clear Water-Based Varnish with UV Inhibitor.
4. Top Coat Sheen:
  - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.

## 2.4 INTERIOR STAIN AND TRANSPARENT FINISH SYSTEMS

### A. Finish on Wood - Decking:

1. One coat(s) sealer.
2. Two coat(s) varnish.
3. Sealer: Water based, sanding sealer, clear.
4. Top Coat: Clear water-based varnish; MPI #128, 129, or 130.
5. Top Coat Sheen:
  - a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.

## 2.5 ACCESSORY MATERIALS

- A. Accessory Materials: Cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of finished surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  1. Wood: 15 percent, measured in accordance with ASTM D4442.

### 3.2 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.

### 3.3 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.

### 3.4 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for general requirements for field inspection.
- B. Owner will provide field inspection.

### 3.5 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

### 3.6 PROTECTION

- A. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

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SECTION 101423 - PANEL SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Panel signage.

1.2 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

1.3 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Manufacturer's product literature for each type of panel sign, indicating styles, font, foreground and background colors, locations, and overall dimensions of each sign.
- C. Shop Drawings:
  - 1. Include dimensions, locations, elevations, materials, text and graphic layout, attachment details, and schedules.
- D. Selection Samples: Where colors, materials, and finishes are not specified, submit two sets of color selection charts or chips.
- E. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- F. Manufacturer's qualification statement.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements for additional provisions.

1.4 QUALITY ASSURANCE

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

1.5 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.

1.6 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain minimum ambient temperature during and after installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Panel Signage:
  - 1. Best Sign Systems, Inc: [www.bestsigns.com/#sle](http://www.bestsigns.com/#sle).
  - 2. FASTSIGNS International, Inc: [www.fastsigns.com/#sle](http://www.fastsigns.com/#sle).
  - 3. Mohawk Sign Systems, Inc: [www.mohawksign.com/#sle](http://www.mohawksign.com/#sle).
  - 4. Vista System LLC: [www.vistasystem.com/#sle](http://www.vistasystem.com/#sle).
  - 5. Substitutions: See Section 016000 - Product Requirements.

2.2 REGULATORY REQUIREMENTS

- A. Accessibility Requirements: 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 restrictive requirements.

2.3 PANEL SIGNAGE

- A. Panel Signage:
  - 1. Application: Room and door signs.
  - 2. Description: Flat signs with engraved panel media, tactile characters.
  - 3. Sign Size: As indicated on drawings.
  - 4. Total Thickness: 1/8 inch.
  - 5. Sign Edges: Squared.
  - 6. Letter Edges: Squared.

7. Corners: Radiused.
8. Color and Font, unless otherwise indicated:
  - a. Character Font: Helvetica, Arial, or other sans serif font.
  - b. Character Case: Upper and lower case (title case).
  - c. Background Color: As scheduled.
  - d. Character Color: Contrasting color.
9. Material: Laminated colored plastic engraved through face to expose core as background color.
10. Tactile Letters: Raised 1/32 inch minimum.
11. Braille: Grade II, ADA-compliant.
12. One-Sided Wall Mounting: Tape adhesive or concealed screws where indicated.

#### 2.4 SIGNAGE APPLICATIONS

- A. Room and Door Signs:
  1. Service Rooms: Identify with room names.
  2. Rest Rooms: Identify with pictograms, the names as scheduled, and braille.

#### 2.5 ACCESSORIES

- A. Concealed Screws: Noncorroding metal; stainless steel.
- B. Tape Adhesive: Double-sided tape, permanent adhesive.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Notify Architect if conditions are not suitable for installation of signs; do not proceed until conditions are satisfactory.

#### 3.2 INSTALLATION

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

- B. Install with horizontal edges level.
- C. Locate panel signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until substantial completion; repair or replace damaged items.

END OF SECTION

SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Solid plastic toilet compartments.

1.2 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Blocking and supports.
- B. Section 102800 - Toilet, Bath, and Laundry Accessories.

1.3 REFERENCE STANDARDS

- A. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth 2019.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate the work with placement of support framing and anchors in walls and ceilings.

1.5 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Provide data on panel construction, hardware, and accessories.
- C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.
- D. Samples: Submit two samples of partition panels in size illustrating panel finish, color, and sheen.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Solid Plastic Toilet Compartments:
  - 1. AJW Architectural Products: [www.ajw.com/#sle](http://www.ajw.com/#sle).

2. ASI Accurate Partitions: [www.asi-accuratepartitions.com/#sle](http://www.asi-accuratepartitions.com/#sle).
3. Metpar Corp: [www.metpar.com/#sle](http://www.metpar.com/#sle).
4. Scranton Products: [www.scrantonproducts.com/#sle](http://www.scrantonproducts.com/#sle).

## 2.2 PLASTIC TOILET COMPARTMENTS

- A. Solid Plastic Toilet Compartments: Factory fabricated doors, pilasters, and divider panels made of solid molded high density polyethylene (HDPE), tested in accordance with NFPA 286; floor-mounted headrail-braced.
1. Color: Single color as selected from manufacturer's full color range.
  2. Doors:
    - a. Thickness: 1 inch.
    - b. Width: 24 inch.
    - c. Width for Handicapped Use: 36 inch, out-swinging.
    - d. Height: 55 inch.
  3. Panels:
    - a. Thickness: 1 inch.
    - b. Height: 55 inch.
    - c. Depth: As indicated on drawings.
  4. Pilasters:
    - a. Thickness: 1 inch.
    - b. Width: As required to fit space; minimum 3 inch.

## 2.3 ACCESSORIES

- A. Pilaster Shoes: Stainless steel, satin finish, 3 inches high; concealing floor fastenings.
1. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.
- B. Head Rails: Extruded aluminum, anti-grip profile.
1. Size: Manufacturer's standard size.

- C. Wall and Pilaster Brackets: Stainless steel; manufacturer's standard type for conditions indicated on drawings.
- D. Attachments, Screws, and Bolts: Stainless steel , tamper proof type.
  - 1. For attaching panels and pilasters to brackets: Through-bolts and nuts ; tamper proof.
- E. Hinges: Stainless steel, manufacturer's standard finish.
  - 1. Continuous-type hinge, self closing.
- F. Door Hardware: Stainless steel, manufacturer's standard finish.
  - 1. Door Latch: Slide type with exterior emergency access feature.
  - 2. Door Strike and Keeper with Rubber Bumper: Mount on pilaster in alignment with door latch.
  - 3. Provide door pull for outswinging doors.
- G. Coat Hook: One per compartment, mounted on door.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify correct spacing of and between plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing.

#### 3.2 INSTALLATION

- A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.
- E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

#### 3.3 TOLERANCES

- A. Maximum Variation From True Position: 1/4 inch.

- B. Maximum Variation From Plumb: 1/8 inch.

### 3.4 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.
- C. Adjust adjacent components for consistency of line or plane.

END OF SECTION

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Commercial toilet accessories.
- B. Commercial shower and bath accessories.
- C. Under-lavatory pipe supply covers.
- D. Electric hand/hair dryers.
- E. Diaper changing stations.
- F. Utility room accessories.

1.2 RELATED REQUIREMENTS

- A. Section 088300 - Mirrors: Other mirrors.
- B. Section 102113.19 - Plastic Toilet Compartments.

1.3 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2023.
- C. ASTM C1036 - Standard Specification for Flat Glass 2021.
- D. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror 2018.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- G. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use 2022.
- H. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.



#### 1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

#### 1.5 SUBMITTALS

- A. See Section 013300 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

#### 2.1 MANUFACTURERS

- A. Commercial Toilet, Shower, and Bath Accessories:
  - 1. AJW Architectural Products: [www.ajw.com/#sle](http://www.ajw.com/#sle).
  - 2. American Specialties, Inc: [www.americanspecialties.com/#sle](http://www.americanspecialties.com/#sle).
  - 3. Bradley Corporation: [www.bradleycorp.com/#sle](http://www.bradleycorp.com/#sle).
  - 4. Bobrick: [www.bobrick.com/#sle](http://www.bobrick.com/#sle).
- B. Under-Lavatory Pipe Supply Covers:
  - 1. Plumberex Specialty Products, Inc: [www.plumberex.com/#sle](http://www.plumberex.com/#sle).
  - 2. Substitutions: Section 016000 - Product Requirements.
- C. Diaper Changing Stations:
  - 1. American Specialties, Inc: [www.americanspecialties.com/#sle](http://www.americanspecialties.com/#sle).
  - 2. Bradley Corporation: [www.bradleycorp.com/#sle](http://www.bradleycorp.com/#sle).
  - 3. Koala Kare Products: [www.koalabear.com/#sle](http://www.koalabear.com/#sle).
  - 4. Foundations Worldwide, Inc.: [www.foundations.com/#sle](http://www.foundations.com/#sle). [www..](http://www..)
- D. Provide products of each category type by single manufacturer.

## 2.2 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. Stainless Steel Sheet: ASTM A666, Type 304.
- C. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.
- D. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.
- E. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

## 2.3 FINISHES

- A. Stainless Steel: Satin finish, unless otherwise noted.
- B. Powder-Coated Steel: Clean, degrease, and neutralize. Follow immediately with a phosphatizing treatment, prime coat, and two finish coats of powder coat enamel.

## 2.4 COMMERCIAL TOILET ACCESSORIES

- A. Mirrors: Stainless steel framed, 1/4 inch thick tempered safety glass; ASTM C1048.
  - 1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
  - 2. Size: As indicated on drawings.
  - 3. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners; satin finish.
  - 4. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
  - 5. Products:
    - a. AJW Architectural Products: [www.ajw.com/#sle](http://www.ajw.com/#sle).
    - b. American Specialties, Inc: [www.americanspecialties.com/#sle](http://www.americanspecialties.com/#sle).
    - c. Bobrick: [www.bobrick.com/#sle](http://www.bobrick.com/#sle).
    - d. Substitutions: Section 016000 - Product Requirements.

- B. Grab Bars: Stainless steel, peened surface.
  - 1. Standard Duty Grab Bars:
    - a. Push/Pull Point Load: 250 pound-force, minimum.
    - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
    - c. Finish: Satin.
    - d. Length and Configuration: As indicated on drawings.
    - e. Products:
      - 1) AJW Architectural Products: [www.ajw.com/#sle](http://www.ajw.com/#sle).
      - 2) American Specialties, Inc: [www.americanspecialties.com/#sle](http://www.americanspecialties.com/#sle).
      - 3) Standard Metal Hardware Manufacturing, Ltd; Grab Bars: [www.smhardware.com/#sle](http://www.smhardware.com/#sle).
      - 4) Substitutions: Section 016000 - Product Requirements.

## 2.5 COMMERCIAL SHOWER AND BATH ACCESSORIES

- A. Robe Hook: Heavy-duty stainless steel, double-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.

## 2.6 UNDER-LAVATORY PIPE AND SUPPLY COVERS

- A. Under-Lavatory Pipe and Supply Covers:
  - 1. Insulate exposed drainage piping, including hot, cold, and tempered water supplies under lavatories or sinks to comply with ADA Standards.
  - 2. Exterior Surfaces: Smooth non-absorbent, non-abrasive surfaces.
  - 3. Construction: 1/8 inch flexible PVC.
    - a. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
    - b. Comply with ICC A117.1.
  - 4. Color: White.
  - 5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces.
  - 6. Products:

- a. Plumberex Specialty Products, Inc; Plumberex Handy-Shield Maxx: [www.plumberex.com/#sle](http://www.plumberex.com/#sle).
- b. Substitutions: See Section 016000 - Product Requirements.

## 2.7 ELECTRIC HAND/HAIR DRYERS

- A. Electric Hand Dryers: Traditional fan-in-case type, with downward fixed nozzle.
  1. Operation: Automatic, sensor-operated on and off.
  2. Mounting: Wall-mounted - surface. ADA compliant.
  3. Cover: Stainless steel with brushed finish.
    - a. Tamper-resistant screw attachment of cover to mounting plate.
    - b. Screened or shielded air intake.
  4. Air Velocity: 18,000 linear feet per minute, minimum, at full power.
  5. Fan/Heater Control: Field adjustable down to approximately half-speed with corresponding reduction in heat output.
  6. Total Wattage: 1150 W, maximum.
  7. Runtime: Field adjustable or automatic, up to 35 seconds.
  8. Electric Hand Dryer Products:
    - a. Excel Dryer Inc; ThinAir Hand Dryer: [www.exceldryer.com/#sle](http://www.exceldryer.com/#sle).
    - b. Mitsubishi Electric Trane HVAC US LLC; Jet Towel, Slim Type: [www.mitsubishielectric.com/#sle](http://www.mitsubishielectric.com/#sle).
    - c. World Dryer Corporation; VERDEdri: [www.worlddryer.com/#sle](http://www.worlddryer.com/#sle).

## 2.8 DIAPER CHANGING STATIONS

- A. Baby Changing Station: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
  1. Material: Stainless steel.
  2. Mounting: Surface.
  3. Minimum Rated Load: 200 pounds min..
  4. Products:

- a. Global Industries.
  - b. Koala Kare.
  - c. ASI.
  - d. Substitutions: 016000 - Product Requirements.
- B. Adult Changing Station: Wall-mounted folding changing station for use in commercial toilet facilities, complying with ANSI Z535.3 and ANSI Z535.4.
1. Material: Stainless steel with ABS replaceable tray liner.
  2. Mounting: Surface.
  3. Minimum Rated Load: 400 pounds min..
  4. Dimensions: 62-65" length x 21-23" deep when in the open position.
  5. Warranty: Warranted against manufacturing defects for a period of 5 years.
  6. Products:
    - a. Foundations; 100-SSE-SM Basis-of-design.
    - b. Global Industries.
    - c. Koala Care.
    - d. Substitutions: 016000 - Product Requirements.

## 2.9 UTILITY ROOM ACCESSORIES

- A. Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, hat-shaped channel.
1. Holders: Three spring-loaded rubber cam holders.
  2. Length: Manufacturer's standard length for number of holders.
  3. Products:
    - a. American Specialties, Inc: [www.americanspecialties.com/#sle](http://www.americanspecialties.com/#sle).
    - b. Bobrick: [www.bobrick.com/#sle..](http://www.bobrick.com/#sle..)
    - c. Substitutions: 016000 - Product Requirements.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. For electrically-operated accessories, verify that electrical power connections are ready and in the correct locations.
- D. Verify that field measurements are as indicated on drawings.
- E. See Section 061000 - Rough Carpentry for installation of blocking, reinforcing plates, and concealed anchors in walls.

### 3.2 PREPARATION

- A. Deliver inserts and rough-in frames to site for timely installation.
- B. Provide templates and rough-in measurements as required.

### 3.3 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.
  - 1. Grab Bars: As indicated on drawings.
  - 2. Mirrors: measured to bottom of mirrored surface.
  - 3. Electric Hand Dryers: As indicated on drawings, measured from floor to bottom of nozzle.
  - 4. Other Accessories: As indicated on drawings.

### 3.4 PROTECTION

- A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

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SECTION 104400 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire extinguishers.
- B. Accessories.

1.2 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.
- B. Section 099123 - Interior Painting: Field paint finish.

1.3 REFERENCE STANDARDS

- A. FM (AG) - FM Approval Guide Current Edition.
- B. NFPA 10 - Standard for Portable Fire Extinguishers 2022.
- C. UL (DIR) - Online Certifications Directory Current Edition.

1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Provide extinguisher ratings and classifications, color and finish, anchorage details, and installation instructions.
- C. Shop Drawings: Indicate locations of individual fire extinguishers, mounting measurements for wall bracket, and accessories required for complete installation.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.5 FIELD CONDITIONS

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.



## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

#### A. Fire Extinguishers:

1. Ansul, a Tyco Business: [www.ansul.com/#sle](http://www.ansul.com/#sle).
2. Kidde, a unit of United Technologies Corp: [www.kidde.com/#sle](http://www.kidde.com/#sle).
3. Nystrom, Inc: [www.nystrom.com/#sle](http://www.nystrom.com/#sle).
4. Potter-Roemer: [www.potterroemer.com/#sle](http://www.potterroemer.com/#sle).
5. Substitutions: See Section 016000 - Product Requirements.

### 2.2 FIRE EXTINGUISHERS

#### A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

#### B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.

1. Class: A:B:C type.
2. Size: 10 pound.
3. Finish: Baked polyester powder coat, color as selected.
4. Temperature range: Minus 40 degrees F to 120 degrees F.

### 2.3 ACCESSORIES

#### A. Extinguisher Brackets: Formed steel, chrome-plated.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.

END OF SECTION

SECTION 122113 - HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Horizontal slat louver blinds.
- B. Operating hardware.

1.2 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

1.3 REFERENCE STANDARDS

- A. WCMA A100.1 - Safety of Window Covering Products 2022.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the placement of concealed blocking to support blinds. See Section 061000.

1.5 SUBMITTALS

- A. See Section 013300 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.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Horizontal Louver Blinds:
  - 1. Hunter Douglas Architectural: [www.hunterdouglasarchitectural.com/#sle](http://www.hunterdouglasarchitectural.com/#sle).
  - 2. Levolor: [www.commercial.levolor.com/#sle](http://www.commercial.levolor.com/#sle).
  - 3. SWFcontract, a division of Springs Window Fashions, LLC: [www.swfcontract.com/#sle](http://www.swfcontract.com/#sle).

4. Substitutions: See Section 016000 - Product Requirements.

## 2.2 BLINDS

- 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.
  2. Thickness: 0.008 inch.
  3. Color: As selected by Architect.
- 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 aluminum; with end caps.
  1. Color: Same as headrail.
- G. Lift Cord: Braided nylon; continuous loop; complying with WCMA A100.1.
- H. Control Wand: Extruded solid plastic; hexagonal shape.
  1. Removable type.
  2. Length of window opening height less 3 inch.
- I. Headrail Attachment: Wall brackets.
- J. Accessory Hardware: Type recommended by blind manufacturer.

## 2.3 FABRICATION

- A. Determine sizes by field measurement.
- B. Fabricate blinds to fit within openings with uniform edge clearance of 1/4 inch.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that openings are ready to receive the work.
- B. Ensure structural blocking and supports are correctly placed. See Section 061000.

3.2 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Secure in place with flush countersunk fasteners.

3.3 TOLERANCES

- A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.
- B. Maximum Offset From Level: 1/8 inch.

3.4 ADJUSTING

- A. Adjust blinds for smooth operation.

3.5 CLEANING

- A. Clean blind surfaces just prior to occupancy.

END OF SECTION

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## SECTION 123200 - MANUFACTURED WOOD CASEWORK

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Manufactured standard and custom casework, with cabinet hardware.
- B. Countertops.

## 1.2 RELATED REQUIREMENTS

- A. Section 016000 - Product Requirements: Requirements for sustainably harvested wood.
- B. Section 061000 - Rough Carpentry: Blocking and nailers for anchoring casework.
- C. Section 079200 - Joint Sealants: Sealing joints between casework and countertops and adjacent walls, floors, and ceilings.
- D. Section 096500 - Resilient Flooring: Resilient wall base.
- E. Section 123600 - Countertops: Additional requirements for countertops.

## 1.3 DEFINITIONS

- A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches above finished floor, tops of cases less than 72 inches above finished floor and all members visible in open cases or behind glass doors.
- B. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches above finished floor and bottoms of cabinets more than 30 inches but less than 42 inches above finished floor.
- C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation and cabinets less than 30 inches above finished floor.

## 1.4 REFERENCE STANDARDS

- A. ANSI A135.4 - Basic Hardboard 2012 (Reaffirmed 2020).
- B. AWI (QCP) - Quality Certification Program Current Edition.
- C. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- D. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.

- E. BHMA A156.9 - Cabinet Hardware 2020.
- F. NEMA LD 3 - High-Pressure Decorative Laminates 2005.

#### 1.5 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Component dimensions, configurations, construction details, joint details, attachments.
- C. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements, placement dimensions and tolerances and clearances required.
- D. Samples for Finish Selection: Fully finished, for color selection. Minimum sample size: 6 inches by 6 inches.
  - 1. Plastic laminate samples, for color, texture, and finish selection.
- E. Manufacturer's Installation Instructions.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Maintenance Data: Manufacturer's recommendations for care and cleaning.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
  - 1. See Section 016000 - Product Requirements for additional provisions.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.
- B. Quality Certification: Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
- C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of experience and approved by manufacturer.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.
- B. Acceptance at Site:

1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.

C. Storage:

1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" Article of this section.

## 1.8 WARRANTY

- A. See Section 017830 - Warranties and Bonds, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion, at no additional cost to Owner. Defects include, but are not limited to:
  1. Delamination of components.
  2. Failure of adhesives.
  3. Failure of hardware.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Plastic Laminate Casework:
  1. Case Systems: [www.casesystems.com/#sle](http://www.casesystems.com/#sle).
  2. Diversified Fixture: [www.diversifiedfixture.com/#sle](http://www.diversifiedfixture.com/#sle).
  3. Labscape LLC: [www.labscape.com/#sle](http://www.labscape.com/#sle).
  4. Substitutions: See Section 016000 - Product Requirements.

### 2.2 CASEWORK, GENERAL

- A. Quality Standard: AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Types: More than one type is required. See drawings for location of each type of casework.
- C. Plastic Laminate Faced Cabinets: Custom Grade.



### 2.3 FABRICATION

- A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.
- B. Construction: As required for selected grade.
- C. Structural Performance: Safely support the following minimum loads:
  - 1. Base Units: 500 pounds per linear foot across the cabinet ends.
  - 2. Drawers: 125 pounds, minimum.
- D. Hardware Application: Factory-machine casework members for hardware that is not surface applied.
- E. Fixed panels at backs of open spaces between base cabinets.
- F. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- G. Scribes and Fillers: Panels of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction.

### 2.4 PLASTIC-LAMINATE-CLAD CASEWORK

- A. Plastic-Laminate-Clad Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.
  - 1. Style: Flush overlay. Ease doors and drawer fronts slightly at edges.
  - 2. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths and heights indicated on drawings, and with following front-to-back dimensions:
    - a. Base Cabinets: 24 inches.
  - 3. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline.
    - a. Finish: Matte or suede, gloss rating of 5 to 20.
    - b. Surface Color and Pattern: As selected by Architect from manufacturer's full line.
    - c. Exposed Interior Surfaces: Thermally fused laminate.
      - 1) Color: White.
    - d. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
    - e. Cap exposed plastic laminate finish edges with plastic trim.

## 2.5 COUNTERTOPS

- A. Countertops: See Section 123600.

## 2.6 CABINET HARDWARE

- A. Comply with BHMA A156.9 requirements.

- 1. Acceptable base materials for plated finishes include brass, bronze, and steel.

- B. Shelves in Cabinets:

- 1. Shelf Standards and Rests: Vertical standards with rubber button fitted rests, satin chromium plated over nickel on base material.

- C. Swinging Doors: Hinges, pulls, and catches.

- 1. Hinges: Concealed, number as required by referenced standards for width, height, and weight of door.

- a. Concealed Hinges: Installed in cabinet edge, and on door back, bright chromium plated over nickel on base material.

- 1) European-Style Hinges for Overlay Doors: 110 degree opening angle.

- 2. Pulls: Chrome wire pulls, 4 inches wide.

- 3. Catches: Magnetic.

- D. Drawers: Pulls and slides.

- 1. Pulls: Chrome wire pulls, 4 inches wide.

- 2. Slides: Steel, full extension arms, ball bearings; self-closing; capacity as recommended by manufacturer for drawer height and width.

## 2.7 MATERIALS

- A. Wood-Based Materials:

- 1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.

- B. Concealed Solid Wood or Plywood: Any species and without defects affecting strength or utility.

- C. Hardboard: ANSI A135.4, Class 1, tempered.

- D. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications. complying with Grade requirements, and standard with the manufacturer.

- E. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.

## 2.8 ACCESSORIES

- A. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness.
  - 1. Color: As selected by Architect from manufacturer's full range.
  - 2. Use only at edges indicated; use plastic laminate cladding at all other edges.
- B. Sealant for Use in Casework Installation:
  - 1. Manufacturer's recommended type.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Site Verification of Environmental Conditions:
  - 1. Do not deliver casework until the following conditions have been met:
    - a. Building has been enclosed (windows and doors sealed and weather-tight).
    - b. An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
    - c. Ceiling, overhead ductwork, piping, and lighting have been installed.
    - d. Installation areas do not require further "wet work" construction.
- B. For Base Cabinets Installation: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 1/2 inch leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.
- C. Verify adequacy of support framing and anchors.
- D. Verify that service connections are correctly located and of proper characteristics.

### 3.2 INSTALLATION

- A. Perform installation in accordance with manufacturer's instructions.
- B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.

- C. Set casework items plumb and square, securely anchored to building structure.
- D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.
- E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
  - 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
  - 2. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
  - 3. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
  - 4. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
- F. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- G. Install hardware uniformly and precisely.
- H. Replace units that are damaged, including those that have damaged finishes.

### 3.3 ADJUSTING

- A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

### 3.4 CLEANING

- A. Clean casework and other installed surfaces thoroughly.

### 3.5 PROTECTION

- A. Do not permit finished casework to be exposed to continued construction activity.
- B. Protect casework and countertops from ongoing construction activities. Prevent workmen from standing on, or storing tools and materials on casework or countertops.
- C. Repair damage, including to finishes, that occurs prior to Date of Substantial Completion, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION

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## SECTION 123600 - COUNTERTOPS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Countertops for manufactured casework.

## 1.2 RELATED REQUIREMENTS

- A. Section 123200 - Manufactured Wood Casework.

## 1.3 REFERENCE STANDARDS

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- D. ISFA 2-01 - Classification and Standards for Solid Surfacing Material 2013.
- E. NEMA LD 3 - High-Pressure Decorative Laminates 2005.

## 1.4 SUBMITTALS

- A. See Section 013300 for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- F. Installer's qualification statement.

- G. Installation Instructions: Manufacturer's installation instructions and recommendations.
- H. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of experience.

## 1.6 DELIVERY, STORAGE, AND HANDLING

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

## 1.7 FIELD 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

### 2.1 COUNTERTOPS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
  - 1. Flat Sheet Thickness: 1/2 inch, minimum.
  - 2. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
    - a. Manufacturers:
      - 1) Dupont: [www.corian.com/#sle](http://www.corian.com/#sle).
      - 2) Formica Corporation: [www.formica.com/#sle](http://www.formica.com/#sle).
      - 3) LG Hausys America, Inc; HI-MACS 12mm: [www.lghausysusa.com/#sle](http://www.lghausysusa.com/#sle).

- 4) Wilsonart: [www.wilsonart.com/#sle](http://www.wilsonart.com/#sle).
  - 5) Substitutions: See Section 016000 - Product Requirements.
  - b. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
  - c. NSF approved for food contact.
  - d. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
  - e. Color and Pattern: As selected by Architect from manufacturer's full line.
3. Other Components Thickness: 1/2 inch, minimum.
  4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch thick; radiused edge; use marine edge at sinks.
  5. Back and End Splashes: Same sheet material, square top; minimum 4 inches high.
  6. Fabricate in accordance with manufacturer's standard requirements.

## 2.2 MATERIALS

- A. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- B. Joint Sealant: Mildew-resistant silicone sealant, white.

## 2.3 ACCESSORIES

- A. Fixed Top-Mounted Countertop Support Brackets:
  1. Material: Steel.
  2. Finish: Manufacturer's standard, factory-applied, textured powder coat.

## 2.4 FABRICATION

- A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
  1. Join lengths of tops using best method recommended by manufacturer.
  2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
  3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.



- B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
  - 1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
  - 2. Height: 4 inches, unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops and wall panels up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

### PART 3 EXECUTION

#### 3.1 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.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

#### 3.2 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.

#### 3.3 INSTALLATION

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Seal joint between back/end splashes and vertical surfaces.

#### 3.4 TOLERANCES

- A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.
- B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.
- C. Field Joints: 1/8 inch wide, maximum.

#### 3.5 CLEANING

- A. Clean countertop surfaces thoroughly.

3.6 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

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SECTION 131414 - AQUATIC PLAY EQUIPMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Aquatic play equipment.
- B. Activation devices for aquatic play equipment.
- C. Controllers for aquatic play equipment.
- D. Color Splash Pad Deck Surface
- E. Water Quality Management System

1.2 SUBMITTALS

- A. See Section 013300 – Submittal Procedures and other applicable references of the contract documents.
- B. Product Data: Manufacturer's descriptive literature for specified systems, including all components.
- C. Shop Drawings: Indicate component connection details and details of interface with adjacent construction and equipment.
- D. Certificates: Certify that products of this section meet or exceed specified requirements.
- E. Manufacturer's Instructions : Indicate installation instructions for specified equipment including each component.
- F. Operation and Maintenance Data: Submit manufacturer's operation and maintenance instruction for specified equipment.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than five (5) years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum of three (3) years' experience.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters' laboratories (UL) as suitable for the purpose specified and indicated.

1.4 REFERENCES

- A. This installation shall comply with all applicable provisions of the latest edition of the following codes:

NEC	National Electrical Code
NFPA	National Fire Protection Association
UBC	Uniform Building Code
UPC	Uniform Plumbing Code

- B. Materials furnished hereunder shall comply with the latest edition of applicable standard specifications published by the following organizations:

ASTM	American Society for Testing and Materials
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
AWWA	American Water Works Association
CS	Commercial Standards
NEMA	National Electrical Manufacturers Association
NSF	National Sanitation Foundation

#### 1.05 SYSTEM DESCRIPTION

- A. Furnish and install aquatic playground materials, apparatus, tools, equipment, transportation, temporary construction, and special or occasional services as required to effect a complete working installation, as shown on the Drawings and described in the Specifications.
- B. Work included:
1. Aquatic playground equipment, valves, and piping.
  2. Plumbing and electrical services including water, waste, and power supply to designated points of connection with site utilities.

#### 1.6 PRODUCT HANDLING

- A. Protection:
1. Equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipment, handling, and storage. Equipment shall be protected from exposure to the elements and shall be kept thoroughly dry at all times prior to installation. Pumps motors, electrical equipment, and other equipment having anti-friction or sleeve bearings shall be stored in weather-tight warehouses that are maintained at a temperature of at least 60 degrees F.
  2. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage. Painted surfaces that are damaged prior to acceptance of equipment shall be repainted to the satisfaction of the Architect.
  3. Electrical equipment controls, and insulation shall be protected against moisture or water damage. Space heaters and sump pumps provided in the equipment shall be kept connected and operating at all times until the equipment is placed in service.
  4. Store materials under cover and elevated above grade.
- B. Replacements:
1. In the event of damage, immediately make all repairs and replacements necessary to the approval of Architect at no additional cost to the Owner.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Equipment not listed within these Specifications or on Drawings as furnished by the equipment supplier but required for the complete installation of the water feature mechanical or electrical systems, shall be furnished by the Contractor.
- B. Products shown on the Drawings, but not listed in this Section, shall be provided in accordance with information shown on the Drawings and the General Provisions of this part of the Specification.

### 2.2 AQUATIC PLAY EQUIPMENT MANUFACTURER

- A. "The Basis of Design" Aquatic play equipment manufacturer is: Water Odyssey™ by Fountain People, Inc., P.O. Box 807, 4600 Highway 123, San Marcos, TX 78666, telephone (512) 392-1155, facsimile (512) 392-1154. Local Water Odyssey™ Representative: 80 West Group. Telephone (877-240-7333).
- B. Other acceptable manufactures include: Waterplay:805 Crowley Ave, Kelowna, BC, 888-890-6257 and Vortex Aquatic Structures International
- C. Products shown on the Drawings, but not listed in this Section, shall be provided in accordance with information shown on the Drawings and the General Provisions of this part of the Specification.

### 2.3 AQUATIC PLAY EQUIPMENT MANUFACTURER'S RESPONSIBILITY

- A. Aquatic playground materials and component parts shall be guaranteed to be free from defects of materials and workmanship, for a period (two years) from date of shipment. Additional warranties shall include;
  - 1. Coating system shall be warranted for a period of (two years) against peeling or fading under normal environmental conditions.
  - 2. Stainless steel pipe and anchor bases shall be guaranteed against structural failure for a period of (twenty-five) years under normal usage.
  - 3. Controller shall be guaranteed against failure for a period of (three years) under normal usage.

### 2.4 AQUATIC PLAY EQUIPMENT

- A. Spray components shall be designed to operate at the specified flow rates.
- B. Anchoring, mounting and assembly hardware shall be constructed of 304/304L Stainless Steel, cast Bronze or Red Brass. All anchoring systems shall include an integrated leveling system facilitating a flat surface installation free of non-compliant protrusions. Exposed and accessible hardware shall be tamper resistant, vandal deterring, theft resistant and shall require a special tool for removal
- C. Top Plates, Component Heads and Spray Nozzles shall be constructed of materials resistant to vandalism, deterrent to theft, require special tools for removal and free from degradation in

transmitting pressurized, chemically treated, potable water. Top Plates, Component Heads and Nozzles constructed of Stainless Steel, Bronze or Red Brass shall be given preference.

- D. Where color coated finishes are appropriate or specified, the color coating shall be Aqua Armor™; an elastomeric polymer that is vandal resistant, UV resistant and resistant to degradation in the presence of chemicals at measurable levels typically used to maintain proper water quality levels in swimming pools.
- E. Accessible edges shall be rounded, beveled or otherwise designed to prevent safety hazards. All components and component parts shall be designed to ensure a safe play environment with no pinch points, head entrapments or protrusion hazards. All products shall be designed in accordance and compliant with ASTM F1487, ASTM F2461 and CSA Z614-98 standards for public playgrounds and aquatic playgrounds.
- F. All play equipment shall be bonded/grounded per the requirements of NEC article 680 and the codes of the local jurisdiction of authority concerning non-residential, permanently installed swimming pools or fountains.
- G. Concrete footings shall be as shown on the Drawings and specified. The Contractor shall provide all labor, material and equipment to construct the concrete footings as shown and shall conform with concrete design specifications.
- H. Play Feature Equipment List from Water Odyssey:

2 Each	#C006	Split Pea
1 Each	#FF4004	Custom Fallen Log Water Table
1 Each	#FF-CT	Custom Cypress Tree
2 Each	#F2052	Rocky Rain
2 Each	#C003	Orbit
3 Each	#C024	Custom Sprig Sprayer
2 Each	#F2126	Custom Large Rock
2 Each	#F3068	Custom Small Rock
2 Each	#F3069	Custom Medium Rock
1 Each	#W391	Solar Spinner
3 Each	#W071	Water Flower
5 Each	#W086c	Directional Eyeball
3 Each	#W393c	Big Sqwerts Water Log
2 Each	W009	Touch N' Go Wired Bollard
1 Each	DSC-0-24	DSC Control Panel

## 2.5 FEATURES

- A. See Plan Drawings for written detailed product specifications and installation details

## 2.6 DISTRIBUTION MANIFOLD

- A. Distribution Header: 4" type 304L stainless steel pipe with flanged connection on both ends.
- B. Solenoid Valves: High strength glass-filled body with stainless steel hardware and 24VAC UL Recognized solenoid.

- C. Balancing Valves: True union ball valve, Schedule 80 PVC.
- D. Water Hammer Arrestor: 2" Copper and brass construction with pre-set operating pressure of 10-35 psi.
- E. Drain Valve: ¾" Cast bronze hose bib.
- F. Pressure Gauge: Discharge Pressure Gauge: 0-60 psi.
- G. Mounting Brackets: Type 304 stainless steel with ½" stainless steel u-bolt.
- H. Equipment List:

1 Each      WMF-04P      Water Odyssey™ Distribution Manifold

## 2.7 SPLASH PAD RECIRCULATION SYSTEM

- A. Splash pad recirculation system specification detailed components can be found on plan documents that have been stamped by NC aquatic engineer and have been submitted for NC Department of Health and Human Services for permitting. If an alternate is to be provided, bid must include approved stamped plans and health department approved permit.
- B. Detailed layout of recirculation system can be found on plan documents, but include 2 deck drains with the capacity of 264 gallons per minute each, Powered rain diverter debris trap, 4,000 gallon recirculation tank with cartridge filters, 20 solenoid valve wall mounted manifold, UV secondary disinfection system on feature pump loop, Feature pump, Recirculation pump, chemical controller, chemical feeder pumps, electrical junction boxes as shown on permitted plans.
- C. Minimum Construction shall consist of an 18-mil thick gel coat skin, two to three layers of 3610 woven fiberglass overlapped in the corners, with properly applied amount of resin, and an out iso layer to ensure waterproofing and integrity. Minimum wall thickness: 3/16".
- D. Enclosure shall use FDA/NSF approved UV resistant gel coating as standard exterior colors.
- E. All steel components of our enclosure hardware shall be 316 or 304L corrosion resistant stainless steel.
- F. Plumbing—All pipe and fittings shall be schedule 40 PVC per ASTM D1785 and N.S.F. approved and stamped for potable water applications, joints to be solvent welded per ASTM D2855. All plumbing materials to confirm to local building code – latest edition.
- G. All plumbing penetrations and couplings shall be factory installed and sealed using two-part epoxy to hold coupling in place, marine grade 5200 caulk on the interior edge of the penetration, and 4 layers of matt fiberglass and polyester resin on the exterior edge to ensure strength and adhesion.
- H. Electrical—All electrical equipment wiring, installation and grounding of pool components shall conform to national fire protection assoc. 70, electrical code (N.E.C.) latest applicable edition and applicable local codes.



- I. Electrical Panel—An externally rated sub panel with the appropriate voltage, phase, and amperage capacity shall be mounted to the enclosure with all components per wired to appropriately sized breakers. Acceptable manufacturers include: Siemens, Eaton – Cutler Hammer.
- J. Equipment—All pumps, filters and disinfection equipment shall be tested and approved by the pertinent manufacturer using the NSF/ANSI standard 50 and listed as approved by the NSF. Flow (GPM), total dynamic head pressures vary per project.
- K. Pumping and Filtration Products – All pumps and filters will be Pentair products unless otherwise specified as a comparable substitute. Other acceptable manufacturers include: Jandy – Zodiac, Hayward, Speck.
- L. 10. Waste Lines – The waste line must be connected to an approved waste disposal system according to local or state codes.
- M. 11. Water Make-up – an automatic and manual water make-up control will be provided to maintain the water level at the applicable volume in the collector tank.
- N. 12. Flowmeter – A flow rate indicator, reading in GPM, shall be installed on the filter return line, the rate of low indicator shall be properly sized for the design flow rate and shall be capable of measuring from half to at least one- and one-half times the design flow rate. The clearances upstream and downstream from the rate of flow indicator shall comply with the manufacturers installation specifications. Acceptable manufacturers include: Blue/white, Flowvis.
- O. 13. Gauges – 1/4" NPT, 2" face diameter water filled gauges for both pressure and vacuum shall be installed where applicable. Acceptable manufacturers include: Wika, Harvard.
- P. 14. Sanitizers – Standard sanitization will be liquid chlorine and muriatic acid, administered using individual peristaltic pumps sized per the needs of the project. Acceptable manufacturers include: Stenner, Roll-a-chem.
- Q. 15. Chemical Storage – Individual double walled HDPE chemical storage vats with lockable lids. 30 or 60 gallons sized per project. secondary spill containment shall be provided where required.
- R. 16. Chemical Automation – An automated oxidation reduction potentiator (ORP) shall be provided and to ensure the pH of the water feature system and PPM of Chlorine stays at the appropriate levels per local code. Acceptable manufacturers include: BecSys, Hayward, Pentair.
- S. 17. Secondary Sanitizers – An additional sanitizer may be provided per client request or per code where required. Acceptable methods include: Ozone, Ultra-Violet light, Advanced Oxidation Process (AOP), Chloro-Saline generator.
- T. 18. Fiberglass Collector tanks – A water reservoir shall be provided with the appropriate volume per project and recirculated no less than every 30 minutes.
- U. 19. Service Light – A 100W equivalent service light shall be provided in the enclosure with a weatherproof switch.

- V. 20. Service GFCI – a 120V duplex receptacle will be provided in the enclosure in a weatherproof case.

## 2.8 FIBERGLASS COLLECTOR TANK SPECIFICATIONS

- A. All component materials of the tank, lid, and flange lip shall be molded using premium virgin polyester resins and glass reinforcing materials. Acceptable manufacturers include: Jushi USA, Reichold Chemicals, A.O.C., & H.K. Research.
- B. Minimum Construction of tank shall consist of an 18-mil thick gel coat skin, two to three layers of 3610 woven fiberglass overlapped in the corners, with properly applied amount of resin, and an out iso layer to ensure waterproofing and integrity. Minimum wall thickness: 3/16"
- C. All plumbing penetrations and couplings shall be factory installed and sealed using two-part epoxy to hold coupling in place, marine grade 5200 caulk on the interior edge of the tank, and 4 layers of matt fiberglass and polyester resin on the exterior edge to ensure strength and adhesion.
- D. Collector tank shall use White or Green FDA/NSF approved gel coating as standard interior colors and exterior of the lid and flange.
- E. Freestanding collectors designed to be buried shall be reinforced as follows: 1"x1" steel frame around the bottom perimeter of the tank, and pressure treated 4"x6" lumber watertight laminated to exterior perimeter of tank every 24-36" of body height depending on application and soil quality. According to the National Design Specification 2012 these bands have a capacity of  $4 \times 6 = F \cdot c \times \text{minimum } C_p \times \text{area} = 1870 \text{psi} \times 0.326 \times 5.5 \times 3.5 = 11723 \text{ lbs.}$
- F. All steel components of the tank such as the hinges, hardware, and locking hasp shall be 316 corrosion resistant stainless steel.  
Hydraulic assisted shocks installed accordingly depending on weight/size of lid.

## 2.9 SPLASH PAD CONCRETE COATING

- A. Tuff Coat is a single component, flexible, water-based non-skid coating created through a unique process of cross-linking urethanes, acrylics, co-polymers and recycled rubber granules to create a long-lasting non-slip finish. This product can be applied by Tuff Coat roller, low-pressure hopper spray gun or commercial texture sprayer.
- B. Concrete deck must cure a minimum of 28 days before application of TuffCoat surface.
- C. Installation consists of removal of all debris, grease, and dirt from surface, one layer of UT-80 Adhesion Primer and two layers of UT-200 Series - Submersible color layer by a certified installer. Two color design selected from manufacture 15 standard colors
- D. UT-80 ADHESION PRIMER is a 2-component water-based epoxy primer/sealer that can be used on concrete, wood, fiberglass and painted surfaces to promote adhesion between the substrate and Tuff Coat. UT-80 Adhesion Primer can be applied to damp concrete surfaces

following proper application procedures. UT-80 Adhesion Primer is compatible with all Tuff Coat rubberized non-skid coatings.

- E. UT-200 Series - Submersible, Medium Texture finish layer. This fully submersible product is designed to provide an attractive, highly durable, impact-resistant, non-slip surface for splash pads, kiddie, catch, and wave pools, spray parks, restroom floors, deck surfaces and other areas requiring slip resistance that can be used in or out of water.

## PART 3 - EXECUTION

### 3.1 SITE AND DRAWING EXAMINATION

- A. Contractors submitting a proposal for this work shall first examine the site of the proposed work that they may fully understand facilities, difficulties, and restrictions attending the execution of the contract. No subsequent allowances shall be made because of omission, error, or negligence in connection with this provision.
- B. Contractors submitting a proposal for this work shall carefully examine the architectural and structural Drawings and Specifications.
- C. Questions pertaining to work that do not appear to be sufficiently detailed or explained, or pertaining to the true meaning of any part of the Drawings or Specifications, or discrepancies found existing in or between the Specifications and Drawings, shall be referred to the architect for clarification or correction.

### 3.2 COORDINATION

- A. The Contractor shall cooperate with subcontractors of other trades, whose work is in any way affected by, or affects the work under this Section.
  - 1. The Contractor shall coordinate the work under this Section with that of other trades to effect a complete installation consistent with the requirements and intent of the Drawings and Specifications.
- B. The Contractor shall furnish materials so as to avoid delay in the progress of the work and shall store them as to prevent interference with other work.

### 3.3 GENERAL INSTALLATION

- A. Install and connect all equipment in accordance with manufacturer's instructions and recommendations unless otherwise noted. If specified installation is contrary to manufacturer's instructions, cease installation of affected components or systems. Notify Project Manager and the Architect and do not resume installation without clear instructions.
- B. Protect pipes, conduits, and equipment from damage from inclement weather.
- C. Parts to be cast in concrete shall be located as detailed on the Plans shall be rigidly supported to resist loads imposed during concrete pour.
- D. Water pipelines shall be flushed free of debris as follows:

1. Completely drain water feature piping and equipment.
  2. Remove construction debris and thoroughly sweep all reservoirs and play area clean. Do not flush debris from play area into system drainage system.
- E. Concrete spray zone deck shall be a monolithic 6" thick pour, with 12" deep turn down at perimeter of slab edge 4,000 psi, broom finish concrete with #3 rebar 15" on center. Spray zone shall have 6" #57 stone and/or crush and run to achieve 90% compaction. Provide ½ inch diameter smooth dowels 24" long at 24" O.C. with 1"-0" embedment each end with one side sleeved to allow for horizontal movement. Provide ½ inch expansion joint with pre-molded filler and sealant at perimeter of splash pad.

### 3.4 DEFECTIVE WORK AND MATERIALS

- A. Materials or work found to be defective or not in strict conformity with the drawings, or different from the requirements of the Drawings and Specifications, or defaced or injured, shall be removed and satisfactory material and work substituted.

### 3.5 CLEAN-UP

- A. Upon completion of the work of this Section, the Contractor shall remove unused equipment and implements of service, and leave the entire areainvolved in a neat, clean, and acceptable condition as approved by the Owner.
1. Soiled, abraded, or discolored surfaces of the aquatic play area shall be cleaned and left free from blemishes or defects.

### 3.6 TESTS AND ADJUSTMENTS

- A. General: The Contractor shall test equipment installed by him to show that it complies with specified requirements. Testing shall be done in a manner approved by the Architect.
- B. Electrical tests:
1. Electrical circuits, feeders, and equipment shall be tested and proven free of faulty grounds, open circuits, or shorts, as required by local codes.
  2. Contractor shall, at his expense, make the aquatic playground operational and make tests, adjustments, and corrections, until it is shown to be in proper operating condition.

### 3.7 WARRANTY

- A. Manufacturer shall warrant all equipment (excluding consumables) for a period of one year from date of installation. For systems with a factory start-up, the warranty shall extend for 18 months from date of start-up. Special Provisions
- B. The following equipment shall be warranted for the terms noted when properly installed and maintained:

1. Structural Pipe: Stainless steel pipe and anchor bases used in the fabrication of Manufacturer play equipment shall be warranted against structural failure for a period of 25 years.
2. Finish Coating: Shall be warranted for a period of 2 years against peeling or fading under normal environmental conditions. All Accents: Shall be warranted for a period of 2 years against fading or cracking under normal environmental conditions.
3. Nozzles: Brass or stainless steel, 5 Years. PVC nozzles, 2 years. Polyurethane Components shall be warranted for a period of 2 Years.
4. Manufacturer Dynamic Sequencing Control Modules, Valve Boxes and Fiberglass Components shall be warranted against defects for a period of 3 years. All DSC Controller components, are to be warranted for 1 year.
5. UV Disinfection Units Manufactured (excluding consumables) shall be warranted for a period of five (5) years after commencement of operation providing that the owner has entered into a service agreement with a factory trained and certified representative to annually (during the warranty period) service the unit as outlined in the Basic Operator's Guide using original manufacturers parts.

END OF SECTION

SECTION 311100 - SITE CLEARING AND DEMOLITION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Removal of designated construction
- B. Removal of surface debris and vegetation
- C. Disposal of materials

1.2 RELATED SECTIONS

- A. Drawings and General provisions of the contract, including General and Supplementary Conditions and Division 1
- B. Section 31 20 00 - Earthwork
- C. Section 31 25 00 – Erosion and Sedimentation Control
- D. Section 31 13 00 – Tree Protection and Trimming

1.3 PROJECT CONDITIONS

- A. Conform to applicable regulations relating to environmental requirements, disposal of debris, and use of herbicides if applicable
- B. Coordinate clearing with utility companies:  
City of Concord and the Owner (County P&R)
- C. Protect utilities and other site services from damage during all phases of work
- D. Protect trees, plants and other features to remain.
- E. Protect benchmarks, survey control points and existing structures from damage or displacement.
- F. Traffic: Conduct site preparation operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks or other occupied or used facilities without permission from authorities having jurisdiction.
- G. Coordination: Confine the work of this Section to area indicated on the Drawings and Coordinate work of this Section to avoid disruption of use of all adjacent facilities, including neighboring properties and public streets.
- H. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

## 3.1 GENERAL

- A. It is the contractor's responsibility to remove all trees, vegetation and debris within the limits of construction, grub the site and removal of all tree stumps where necessary. This shall consist of cutting, removal, and satisfactory disposal of all vegetation, debris, rock, or other non-essential site elements as directed by the plans and specifications or by the Architect.
- B. The work covered by this Section will include the removal and disposal of all surface rock, tree trunks, etc. within the construction limit lines.
- C. All work under this Section shall be performed in a manner, which will cause a minimum of soil erosion. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place. The Contractor shall perform such erosion control work, temporary or permanent, as directed by the Architect, in order to satisfactorily minimize erosion resulting from clearing and grubbing operations and the removal of pavements, walls and other site structures.
- D. Failure on the part of the Contractor to perform the required erosion-control measures will be just cause for the Architect to direct the suspension of clearing and site demolition operations. The suspension will be in effect until such time as the Contractor has satisfactorily performed the required erosion control work.
- E. Dust Control: Use all means necessary to prevent spread of dust during performance of the work in this section. Thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors and concurrent performance of other work on the site.

## 3.2 PREPARATION

- I. Conform to applicable regulations relating to environmental requirements, disposal of debris, and if applicable use of herbicides.
- J. Locate and identify utilities and other site services such as irrigation and storm drainage etc. Contact the Owner for marking services not covered by the Utility Company locator service.
- K. Soft-dig (hand excavate) potential conflicts or crossings
- L. Construction limits are shown on the Drawings. Prior to beginning clearing operations the contractor will notify the Owner and Engineer/Landscape Architect for approval of the staked construction limits and review of any vegetation needing special care or protection.
- M. Protection of Existing Items:
  - 1. Provide barricades, coverings, or other types of protection necessary to prevent damage to existing improvements to remain in place.
  - 2. Protect improvements on adjoining properties as well as those on the Owner's property.

3. Restore all improvements damaged by this work to their original condition, as acceptable to the Owner of other parties or authorities having jurisdiction.
- N. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place, against unnecessary cutting, breaking, skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, and excess foot or vehicular traffic, or parking of vehicles within the drip line. Provide temporary guards to protect vegetation to be left standing as directed by the Owner.

### 3.3 CLEARING

- A. Clear areas required for access to site and execution of work
- B. The work of clearing and grubbing shall also include the removal and satisfactory disposal of weeds and other annual growth; the removal and satisfactory disposal of rubble and debris; and the filling of holes and depressions. This work shall also be performed in all non-wooded areas within the construction limits shown on the Drawings, upon which seeding and mulching are to be performed.
- C. The work of grubbing shall consist of the removal and satisfactory disposal of all vegetation and surface debris.
- D. Clearing and grubbing operations shall be completed sufficiently in advance of grading operations as may be necessary to prevent any of the debris from the clearing and grubbing operations from interfering with the excavation or embankment operations.
- E. The Contractor will be responsible for removing all surface garbage, junk and other debris within the construction limit lines.
- F. The Contractor shall conduct his operations in a manner to prevent limb, bark, or root injuries to trees, shrubs, or other types of vegetation that are to remain growing and to prevent damage to adjacent property. When any such injuries unavoidably occur, all rough edges or scarred areas shall first be made reasonably smooth in accordance with accepted horticultural practice and scars thoroughly covered with asphalt based tree paint. Plants that are damaged by any construction operations to such an extent as to destroy their value for shade or other landscape purposes shall be cut and disposed of by the Contractor, with extra compensation provided to the Owner.

### 3.4 REMOVAL

- A. Topsoil Removal:
  1. Topsoil is friable clay-loam surface soil found in depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 1 inch in diameter, and without weeds, roots, and other objectionable material.
  2. Strip topsoil to whatever depths encountered, and in such manner so as to prevent intermingling with the underlying subsoil or other objectionable material.
  3. Remove heavy growths of grass from areas before stripping.
  4. Where trees are indicated to be left standing, stop topsoil stripping a sufficient distance to prevent damage to main root system.



5. Stockpile topsoil shall be located within the disturbed limits and/or placed back in any approved borrow area. The topsoil may also be tested and screened for use at the soccer fields with approval from the Landscape Architect and Owner's representative. Topsoil shall be free of debris, etc. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent wind-blown dust
  6. Dispose of excess topsoil as waste material as herein specified.
- B. Remove surface rock of larger than 1" diameter within all sports field limits.
- C. Remove all debris from the site (Disposition of timber, stumps, rock, debris, and spoil)
1. The Owner will have no right to use or reserve for his use any timber on the project specified for removal within the limits of this contract scope. All timber cut during the clearing operations is to become the property of the Contractor and shall be disposed of properly.
  2. The Contractor shall not cut any timber beyond the clearing limits established by the Architect, nor shall he cut any timber, which is to be preserved for landscape or erosion-control purposes.
  3. Remove all clearing waste, excess soil and vegetative spoil from the site and dispose of these materials legally.
  4. Leave the site in a neat and orderly condition to the approval of the Owner.

END OF SECTION

## SECTION 312000 - EARTHWORK

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

- A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

## 1.2 WORK INCLUDED IN THIS SECTION

- A. Work of this section shall consist of rough grading, excavation, compaction, fine grading and removal and replacement of unsuitable soil and rock.

## 1.3 GENERAL REQUIREMENTS

- A. Earthwork and all other construction shall be performed to the lines and grades indicated by the drawings and the specifications herein. All slopes shall be graded evenly and smoothly, as shown on the drawings.
- B. When material encountered is considered unsuitable by the engineer of record or the owner's geotechnical engineer, such material shall be excavated below the grades shown on the drawings, or as directed by the engineer of record or the owner's geotechnical engineer and replaced with suitable material. All excavation materials which are not required or are unsuitable for fills shall be considered as waste.
- C. Waste material shall be utilized on-site when possible to reduce off-site disposal. The contractor shall prepare an exhibit for the owner or the owner's geotechnical engineer to review and approve.
- D. The contractor shall protect and maintain benchmarks or other reference points from dislocation or damage. The contractor shall also provide adequate barricades, fences, warning lights, and signs, as necessary for the protection of persons and property during work in process.
- E. Before the contractor begins work, he shall establish the location and extent of all underground utilities within the construction limits and coordinate with the owner of the utility.

## 1.4 TEMPORARY SUSPENSION OF WORK

- A. The engineer of record or the owner's geotechnical engineer may require the contractor to suspend earthwork operations entirely or in part for such period or periods as he may deem necessary, due to unsuitable weather or such other conditions as are considered unfavorable for satisfactory execution of the work.

- B. If work is suspended for indefinite periods, the contractor will take every precaution to prevent damage or deterioration of the work already performed, provide suitable and functional drainage by opening ditches, filter drains, temporary cutoff lines, etc., and erect temporary protective earth structure where necessary. All filled areas are to be back-bedded and reasonably sealed to protect against adverse weather conditions.
- C. The contractor shall not suspend work without the written authority from the owner and shall proceed with the work promptly when notified by owner, the engineer of record or the owner's geotechnical engineer to resume operations.

#### 1.5 TOPSOIL

- B. Topsoil shall be free of subsoil, stumps, rocks larger than two- inch diameter, brush, weeds, toxic substances, and other material or substance detrimental to plant growth.

#### 1.6 STRIPPING OF TOPSOIL

- A. Strip topsoil from all areas to be excavated, paved, or re-graded. Prior to stripping topsoil, scrape areas clean of all brush, weeds, grass, roots, rocks, and other loose materials. Debris and stones larger than two- inches in diameter are not permitted in stripped topsoil scheduled for reuse as topsoil. Dispose of all scraped debris and materials off-site.
  - 1. All organic laden topsoil should be stripped from all fill areas including beneath all fill slopes out to the toe of the proposed slope. After stripping of the topsoil, all fill areas including fill slope areas should be proof-rolled, refer to item 1.13. Unstable areas should be stabilized prior to fill placement.
- B. Strip existing topsoil to a depth of four inches and stockpile separately from sub-soils at locations not interfering with construction operations. Do not drive heavy equipment over stockpiled topsoil or conduct any activity that will compact the topsoil.

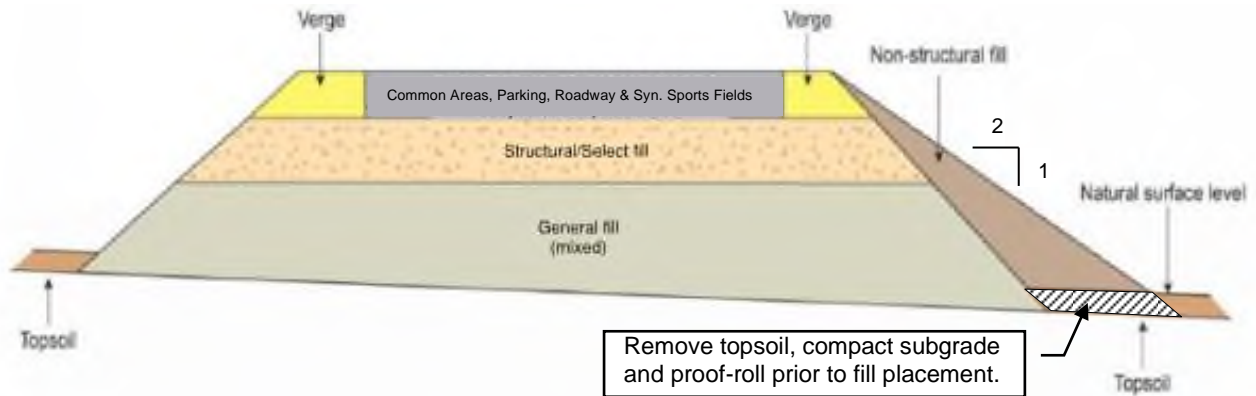
#### 1.7 GENERAL BACKFILL AND STRUCTURAL FILL

- A. Material excavated for use on-site shall be classified according to ASTM D 2487 by a qualified testing agency indicating and interpreting test results for compliance and suitability for use
- B. Material Test Reports: For each on-site soil material proposed for fill and backfill perform laboratory compaction curve according to ASTM D698.
- C. Structural Fill / Backfill

1. Shall be soil having a classification of GW, GM, SM, SW, SC, ML or CL.
2. Shall be free of sod, wood, organic soil, rubbish, debris, metal, and rocks greater than three inches in diameter and capable of being compacted into a dense and stable condition as specified.
3. Soils containing more than 5 percent (by weight) fibrous organic materials or having a Plasticity Index (PI) greater than 25 should not be used for structural fill or backfill.

D. General Fill

1. Soils require mixing to form general fill for establishing final grade; the following procedure can be performed under the observation of the geotechnical representative.
2. Organic laden topsoil may be mixed for use as a general fill in constructing fill slopes at 2:1 (horizontal: vertical) from the mixed general fill and structural fill placement areas beginning at a minimum of five (5) feet outside the perimeter sidewalks, curb or field area.
  - a. Recommended slope grading: The grading of the fill slopes should be performed in a bottom to top process. Beginning at the bottom of the proposed slope, the existing sloping grades to receive fill should be stripped of all topsoil, trash, debris and other organic materials and benched horizontally to the minimum width of the compactor used or 5 feet, whichever is greater. Benching should continue up the existing slope surface beginning at the top of the previous bench. All fill slopes should be over-built and "cut-back" to design grade to achieve adequate compaction at the slope surface.
  - b. All fill material placed outside the aforementioned 2:1 (horizontal: vertical) slopes should be placed in loose lifts not exceeding 8 inches in thickness and then compacted. Final slope surface should be compacted with tracked equipment.
  - c. Depending upon the type of compaction equipment used, lift thicknesses may need to be reduced or drying of the slope material may be required to properly compact the slope material.
3. General fill may be made using an approximate 8 to 10 ft top cut in all cut areas, resulting in a soil blend to include topsoil.
4. General fill shall be compacted to a minimum 95% density.
5. General fill shall be placed below the minimum five-foot strata identified as Structural or Select Fill. Cut below the top cut will be placed in all fill areas to establish final grade or sub grade (to be adjusted based on topo).
6. All rock encountered shall be disposed in the deeper fills or outside fill slopes
7. No mixed general fill is allowed under buildings; this includes a fifteen (15) foot offset from the building edge, the area should be constructed entirely with structural fill or within cut soils.



## 1.8 EXCAVATION

- A. All suitable material removed in the excavation shall be used as far as practicable in the formation of structural fill or general fill.
- B. The owner's geotechnical engineer will designate materials deemed unsuitable or not to be included in the mixing operation for general fill.
- C. The contractor shall control the grading within the construction limits as shown on the drawings, so that the surface of the ground will be properly sloped, diked, or ditched to prevent water from entering the excavated areas. The contractor shall maintain sufficient personnel and equipment with which he shall promptly and continuously remove all water from any source entering or accumulating in the excavation or other parts of the work. All water pumped or drained from the work shall be disposed of in a suitable manner, without damaging adjacent property or other work under construction.
- D. The intersection of slopes with natural ground surfaces, including the beginning and ending of cut slopes, shall be uniformly rounded as shown on the drawings and as directed by the engineer of record or his/her representatives. All slopes shall be finished to reasonably uniform surfaces acceptable for seeding and mulching operations. All protruding rocks, roots, and other objectionable vegetation shall be removed from slopes.
- E. All cuts shall be brought to the grade and cross section shown on the drawings, prior to final inspection and acceptance by the engineer of record or the owner.

## 1.9 UNDERCUT/UNSUITABLE SOIL EXCAVATION

- A. See Section 31 23 16.

## 1.10 ROCK EXCAVATION

- A. See Section 31 23 16.

1.11 COMPACTION

- A. Fill compaction shall be accomplished by thoroughly compacting each layer with sheep-foot rollers, pneumatic-tired rollers, steel-wheeled rollers, and mechanical tampers in places inaccessible to rollers or other equipment. When material has too much moisture, grading operations shall be limited to drying soil by spreading and turning for drying by the sun and aeration. When material is dry, moisture shall be added by sprinkling by approved means.
- B. All fills shall be compacted to the following percentages of the maximum dry density and within the following moisture range, in terms of optimum moisture as determined by the Standard Proctor Density Test, ASTM, D698, Method C or as designated by the owner's geotechnical engineer.

The following table shall be used, unless otherwise specified.

Table of Compaction:

Type of Fills	<u>Depth</u>	<u>Minimum Density %</u>	<u>Moisture Range</u>
Roadway	Top 24 inches Remainder	98% 95%	± 2% Of Optimum Content
Parking Area and Other Paved Surfaces	Top 18 inches Remainder	98% 95%	± 2% Of Optimum Content
Synthetic Turf Fields	Top 18 inches	95%	± 2% Of Optimum Content
Utility trenches	Full depth	95%	± 2% Of Optimum Content
Common Areas (grass/turf)	Each layer of backfill or fill	90%	± 3-5% Of Optimum Content

1.12 DRAINAGE AND REMOVAL OF WATER

- A. The contractor shall control the grading in the vicinity of all graded areas so that the surface of the ground will be properly sloped, diked or ditched to prevent water from standing in all excavated areas, except the creek bottom. The contractor shall maintain personnel and equipment capable of prompt and continuous removal of all water from any source entering or accumulating in the graded areas, except the creek bottoms. All

water pumped or drained from the work shall be disposed of in a suitable manner, without damaging adjacent property of other work under construction.

#### 1.13 PROOF-ROLLING

- A. Proof-rolling under the observation of the owner's representative will be performed using a four-wheeled, rubber-tired roller or similar approved equipment having a minimum loaded weight of 25 tons, as follows:
1. Immediately following stripping, all areas to receive fill shall be proof-rolled. The proof-roller shall make at least four passes over each location, with the last two passes perpendicular to the first two. Any areas which deflect, rut, or pump shall be undercut to depths and lateral extents, as determined by the Owner's geotechnical engineer. All undercut areas shall be replaced with compacted structural fill material.
  2. Following completion of cut and fill operations, and immediately prior to aggregate base course placement for paved and structural areas, all subgrade areas will be proof-rolled. Any local areas which deflect, rut, or pump under the roller shall be undercut and replaced with compacted structural fill material, as specified herein.

#### 1.14 SOIL INSPECTION AND TESTS

- A. The Owner will be responsible for the testing and will retain the services of a commercial soil-testing laboratory to coordinate and with the Contractor. When deemed necessary by the Owner's representative, excavated and fill material shall be removed, selected, placed, and compacted under supervision of the Owner's representative. The Contractor is encouraged to have an allowance in his/her bid for miscellaneous testing (beyond the Owner's representative lab) to ensure specifications are met. The Owner's representative shall have the authority to approve or disapprove the condition of the subgrade on which fill is to be placed, filled material, placement methods, and compaction methods, and he shall make compaction density tests as necessary to determine that the specified density is obtained.
- B. The Contractor shall notify the Owner at least three days prior to starting earthwork operations, in order that suitability of material for compaction may be checked, and no material shall be used that has not been previously checked and approved by the Owner or laboratory. The Owner shall be notified before any cut is made or fill is placed, in order that the laboratory representative may be present during all critical grading operations. The contractor shall remove, replace, re-compact and retest all fills failing to meet the density requirements, at his own expense.

### 1.15 COMPACTION OF SOIL BACKFILLS AND FILLS UNDER STRUCTURES

- A. Place backfill and fill soil materials in layers not more than eight inches in loose depth for material compacted by heavy compaction equipment, and not more than four inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698.
- D. Under structures, building slabs, steps, and under roof pavements, scarify and re-compact top 12 inches of existing subgrade and each layer of backfill or fill soil material at min of 98 percent.

### 1.16 COST OF TESTING

- A. A soil testing laboratory shall be retained and paid by the Owner to observe and inspect fill placement and compaction. Refer to items 1.13, and 1.20 for further information regarding the testing.

### 1.17 FINAL GRADING AND SOIL PREPARATION

- A. Compact and shape to finish grade by leveling and raking to remove all lumps, stones, or other objectionable material, to present an even, uniform surface prior to seeding or planting.
- B. After entire graded area has been brought to the finished grades shown on drawings, all areas shall be left smooth and free from erosion, ridges, ditches and evidence of ponding. Final grades shall be free from all roots, debris, rock, and soil lumps and left in readiness for seeding.
- C. Prior to acceptance of the entire project, the contractor shall correct all graded areas of all damages due to washes, settlement, erosion, equipment ruts, or any other cause, at his expense.
- D. Soil in all lawn areas shall be uncompacted and amended to a minimum depth of four inches and meet the finished grades as shown on the drawings prior to receiving seed and mulch or sod.
- E. Planting strips and islands shall be prepared in accordance with the appropriate Section of the City of Concord Code of Ordinances.
- F. Soil in all other disturbed areas shall meet the finished grades as shown on the drawings prior to installation of erosion control blankets and receiving seed and mulch or



hydroseed. Soil shall be amended as necessary to establish a permanent vegetative cover as prescribed by North Carolina Department of Environmental Quality.

#### 1.18 DRAINAGE COURSE UNDER SLABS-ON-GRADE

- A. Drainage Course: Narrowly graded mixture of crushed stone; or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- B. Place drainage course on subgrades free of mud, frost, snow, or ice.
- C. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
  - 1. Place drainage course in a single layer.
  - 2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

#### 1.19 MAINTENANCE OF THE PROJECT

- A. The contractor shall maintain the project from the date of availability or the date of beginning work, whichever occurs first, until the project is finally accepted. This maintenance shall be continuous and effective and shall be prosecuted with adequate equipment and forces to the end that all work covered by the Contract is kept in satisfactory and acceptable condition at all times.

#### 1.20 FREQUENCY OF INSPECTION AND TESTING

- A. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- B. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect and/or owner's geotechnical engineer.
- C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2,000 square feet. of vertical lifts placed in the building area slab, but in no case fewer than three tests.
  - 2. Building/Structure Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 50 feet or less of wall length, but no fewer than 4 tests.
  - 3. Roads, Drives, Parking Areas and Walks: at subgrade and each vertical lift at no less than 1 test per 5,000 square feet (or as per the County Engineering).

4. Athletic Field Areas: at subgrade and each vertical lift at no less than one test per 10,000 square feet (or as per the County Engineering).

#### 1.21 FINAL CLEANING UP

- A. Before final acceptance of the project, all ground occupied by the contractor in connection with the work shall be cleaned of all rubbish, excess materials, temporary structures, and equipment; and all parts of the work shall be left in an acceptable condition.

#### 1.22 MAINTENANCE OF TRAFFIC

- A. The contractor will be required to maintain through and local vehicular and foot traffic within the limits of the project, including all existing park road and parking lot which abut the project and are within the project limits. Traffic shall be maintained from the time the contractor begins work on the project site until final acceptance of the project, including any periods during which the contractor begins work on the project until final acceptance of the project, including any periods during which the contractor's operations are suspended. The contractor shall conduct his work in a manner which will create a minimum amount of inconvenience to traffic.
- B. The contractor shall be responsible for maintaining in a safe, passable, and convenient condition, such part or parts of existing city/county/state roads as are to be used by him to maintain local or through traffic within the limits of the project from the time the contractor begins work on the project until final acceptance of the work. The maintenance of said existing facilities shall be considered as incidental to the various items of contract work, and the contractor will not be directly compensated therefore.
- C. Signing, barricades, lighting, traffic control devices, and traffic control operations used in maintaining traffic shall be in accordance with the applicable provisions of the state edition in effect on the date of advertisement.

#### 1.23 METHOD OF DETERMINATION OF ROCK AND UNDERCUT MEASUREMENT

- A. The contractor shall expose and clean the rock material and undercut areas (unsuitable soils) for inspection and measurement by the engineer of record or his/her representative and the owner's geotechnical engineer. Any material moved or removed without measurement and approval by owner or the engineer of record will be considered as earth excavation.

#### PART 2 - PRODUCTS (NOT USED)

END OF SECTION

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## SECTION 312500 - EROSION AND SEDIMENTATION CONTROL

## 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 GENERAL

- A. JOB SITE CONSTRUCTION ENTRANCE — The contractor shall install a proposed 50ft x 24ft driveway entrance with suitable stone for vehicle wheel cleaning at the staging area approved by the Owner. Additionally the contractor will provide erosion and sediment protection around the staging area as needed to prevent sediment from infiltrating surrounding drainage ways and pavements.
- B. Soil erosion and sedimentation control shall be provided by the contractor for all areas of the site that are graded or disturbed. Control measures, such as modifying the natural buffer zone and erecting silt fences and barriers, check dams or other structures shall begin prior to any land-disturbing activity. Additional measures shall be constructed as required during the construction. All facilities installed shall be continuously maintained during construction, until the disturbed areas are stabilized.
- C. Contractor shall provide permanent or temporary ground cover within 15 working days after completion of the construction phase of any specific area. Contractor shall have full responsibility for construction, maintenance and compliance of all control facilities, in accordance with state and local soil erosion and sedimentation control laws.

## 1.3 SECTION INCLUDES

- A. Furnishing, installing, and maintaining temporary erosion controls and temporary sedimentation controls.
- B. Temporary seeding.
- C. Mulching.

## 1.4 RELATED SECTIONS

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

## 1.5 REFERENCES

- A. Refer to NCDEQ Erosion and Sediment Control Planning and Design Manual
- B. EPA, "Storm Water Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices."

## 1.6 DEFINITIONS

- A. Temporary erosion controls shall include grassing, mulching, watering, and reseeding on-site sloped surfaces, providing berms at the top of the slopes and providing interceptor ditches at the ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or minimized.
- B. Temporary sedimentation controls shall include silt dams, traps, barriers, and appurtenances to control soil erosion.

## 1.7 SUBMITTALS

- A. General: Submit the following in accordance with conditions of contract and general conditions sections:
  - 1. Product data for silt barriers and netting.
  - 2. The Contractor has the option to submit additional control measures in the form of shop drawings.
  - 3. Certificates of purity and content for all seed products.
    - a) Provide fresh, clean, new crop seed complying with tolerance for purity and germination as established by the Official Seed Analysts of North America.
    - b) Provide seed mixtures composed of grass species and other cover crop at the proportions and rates indicated on the drawings.
    - c) Submit seed vendor's certified statement for each seed mixture required, stating botanical and common name, percentages by weight, and percentages of purity, germination and weed seed content for each specified seed species.

## 1.8 QUALITY ASSURANCE

- A. Provide erosion control methods in accordance with methods as indicated on the erosion control plan and/or requirements of authorities having jurisdiction. The Contractor shall comply with all National Pollutant Discharge Elimination System (NPDES) rules and regulations in terms of both installation and maintenance during construction.

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the site under provisions of general conditions.
- B. Store and protect products under provisions of general conditions.
- C. Deliver grass and other seed crop materials in sealed containers. Damaged packaging containing product is not acceptable.

## 1.10 METHOD OF PROTECTION

- A. Existing structures and facilities shall be protected from sedimentation. Contractor shall be responsible for the construction of necessary measures, and all costs shall be included in the contractor's bid. Items to be protected from sedimentation deposits shall include, but are not

limited to, all downstream property, natural waterways, streams, lakes and ponds, catch basins, drainage ditches, roads, gutters, and natural buffer zones, as well as man-made structures. The following measures are listed as a guide for the protection of existing structures and facilities. Design and construction of the measures shall be in accordance with all applicable laws, codes, ordinances, rules and regulations, and as detailed on the contract drawings.

## PART 2 – PRODUCTS

The listing of product or best management practices (BMPs) is provided for informational purposes to assist the contractor in selecting appropriate BMPs for the site as might be required to protect their work and provide an acceptable finished product.

### 2.1 SILT FENCE

- A. Silt fence must be in accordance with SCDHEC Stormwater Management BMP Handbook requirements. At contractor's option, prepackaged fencing may be used. Contractor to submit product information for approval prior to installation.

### 2.2 INLET PROTECTION

- A. Inlet protection devices shall be as indicated on the Drawings or as required by SCDHEC Stormwater Management BMP Handbook

### 2.3 BERMS AND DIVERSION DITCHES

- A. These are graded channels with a supporting ridge on the lower side, constructed across a sloping land surface. Diversion ditches and berms shall be planted in vegetative cover as soon as completed.

### 2.4 SEDIMENT BASINS (Skimmer basins & Rock basins included)

- A. Sediment Basin - These are sediment traps formed by damming a waterway or by excavating a basin to retain sediment and to reduce the flow rate downstream. Emergency spillway, perforated riser, anti-seep collars, trash rack, base, anti-vortex device or skimmer e may be required. See construction plans for details.
- B. Skimmer Sediment Basin -These are sediment traps formed by damming a waterway or by excavating a basin to retain sediment and to reduce the flow rate downstream. Emergency spillway, PVC skimmer dewatering device, baffles, anti-seep collars, skimmer exit pipe and anchor, may be required. See construction plans for details

### 2.5 DITCH CHECK DAM

- A. Contractor shall install Check Dams as required. The contractor shall maintain the dams throughout the project and remove the silt from the basin as directed by the Designer. The contractor shall also make any repairs to the dam as needed as indicated by the Designer. At the end of the project upon approval by the Designer, the contractor shall remove the dam. The contractor shall construct and maintain silt basins and diversion ditches to contain runoff from on site stock piles of soil or sand. At the end of the project all stock pile areas shall be restored to pre-construction or better conditions.

## 2.6 RIPRAP FOR OUTLET CONTROL AND DITCHES

- A. Riprap shall be placed at storm drainage outlets as shown on the drawings. All rock shall be per SCDOT standards, as indicated on the Drawings. The general contractor at the completion of the project shall insure that the aprons are clean; contain no sediment; are free of grass and weeds and the outlets are properly placed on geotextile fabric.

## 2.7 MULCHING

- A. Mulching shall be used to prevent and to hold soil and seed in place during the establishment of vegetation. Jute matting may also be used where seeding may be troublesome. Contractors to submit product for approval prior to installation.

## 2.8 SWALE STABILIZATION

- A. Synthetic swale liners shall be used for temporary stabilization during the establishment of permanent cover on problem areas such as future grassed ditches, channels, long slopes and steep banks, as directed by the erosion control plans. There may also be areas as indicated on the plans for placement of permanent erosion control fabric. North American Green products listed on the plans are listed to convey the designed level of protection for erosion purposes. The acceptable manufacturers for this product will be North American Green, Tensar, Mirafi.

## 2.9 "HIGH-RISK" AREAS

- A. On slopes steeper than 2:1 and less than 1:1 utilize synthetic slope stabilization as identified on the site plan, shall be used. Material installation shall be approved by manufacturer's representative. Contractor to submit products for approval prior to installation.

## 2.10 OTHER METHODS

- A. Other methods of protecting existing structures and facilities, such as vegetative filter strips, diversions, riprap, baffle boards and ditch checks used for the reduction of sediment movement and erosion may be used at the option of the appropriate state or local authorities. The contractor may wish to refer to SCDHEC Stormwater Management BMP Handbook.
- B. After disturbed areas are stabilized, all temporary construction features shall be removed; the sediment shall be spread in a manner not to adversely affect protection procedures.

## 2.11 TEMPORARY SEED MATERIALS

- A. Seed mixtures for temporary erosion protection application are specified on the construction plans.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Erosion control devices as shown on the drawings are the minimum required based upon the

- finished grades for the site. Contractor is responsible to provide additional devices for erosion protection at the Contractor's expense to minimize erosion leaving the site during all phases of activity.
- B. The Contractor shall construct the sedimentation ponds and control devices prior to clearing and grubbing the site to ensure complete silt control. When the silt or the debris level is greater than 1 foot above the bottom of pond, the Contractor shall remove the silt or debris to restore the proper storage elevation from the bottom of the pond.
  - C. Silt dams, traps, barriers, and appurtenances shall be installed and shall be maintained in place for duration of construction. This is done by periodically replacing silted structures or removing the silt from the up-gradient side of it.
  - D. Erosion and sedimentation controls shall be properly maintained in a condition which will retain unfiltered water.
  - E. The Contractor shall be solely responsible for ensuring that no silt or debris leaves the immediate construction site. Any silt or debris that does leave the immediate site shall be cleaned up, and the area disturbed shall be returned to its natural state as directed by the Owner's Representative at the Contractor's expense.
  - F. The Contractor shall be responsible to clean-up all silt debris built up on the site and for the removal of all erosion control measures at the appropriate times as directed by the Owner's Representative.
  - G. The Contractor shall be required to maintain temporary construction entrances and remove all mud and debris from public roads on a daily basis, or more often if needed.

### 3.2 TEMPORARY SEEDING

- A. Seed Bed Preparation:
  - 1. Rough grade lawn areas to smooth, even surface with loose uniformly fine texture. Roll, rake, and drag lawn areas. Remove ridges and fill depressions as required to meet finish grades. Limit fine grading to areas which can be planted immediately after grading.
  - 2. Prepared seed bed shall be friable topsoil, free from subsoil clay lumps, brush, weeds, and other litter, and shall be free of roots, stumps, and stones larger than 1 inch in any dimension.
  - 3. If seed bed has become muddy, hard or excessively dry, re-till to a smooth, friable, uniform condition; free from stones or lumps. Re-grade all settling prior to seeding. Seed immediately after bed preparation.
- B. Seeding Areas Less Steep than a 1 Vertical to 3 Horizontal Slope:
  - 1. Do not use wet seed or seed that is moldy or otherwise damaged in transit or storage.
  - 2. Place seed with a mechanical drill seeder (Brillion or equal). Distribute seed evenly over entire area by drilling equal quantity in 2 directions at right angles to each other.
  - 3. Do not seed immediately following rain or if seed bed is muddy.
  - 4. Roll sown area with a roller weighing at least 200 pounds per lineal foot.



5. Immediately after seeding and compacting, apply mulch material to attain even coverage over the entire target area.
- C. Seeding Areas Steeper than a 1 Vertical to 3 Horizontal Slope:
1. Mix specified seed, and pulverized mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogenous slurry suitable for hydraulic application.
  2. Apply slurry uniformly to all areas to be seeded. Rate of application as required in order to obtain specified seed sowing rate.
  3. On all slope areas 1:3 or steeper (or as designated on the drawings), incorporate woodfiber tackifier into hydroseed slurry. Tackifier shall be Conwed 2000 or equal and applied at a rate of 1,750 pounds per acre.
  4. Erosion control blankets, as specified and called for on the drawings, may be necessary.

END OF SECTION

## SECTION 313116 - TERMITE CONTROL

## PART 1 - GENERAL

## 1.1 SECTION INCLUDES

- A. Chemical soil treatment.

## 1.2 REFERENCE STANDARDS

- A. North Carolina Structural Pest Control Rules
- B. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act.

## 1.3 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.
- C. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

## 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing this type of work.
  - 1. Having minimum of 2 years documented experience.
  - 2. Approved by manufacturer of treatment materials.
  - 3. Licensed in South Carolina.

## 1.5 REGULATORY REQUIREMENTS

- A. Conform to applicable code for requirements for application and comply with EPA regulations.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of toxicants.

## 1.6 WARRANTY

- A. See Section 017800 - 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.
  - 2. Inspect annually and report in writing to Owner. Provide inspection service for five years from Date of Final Acceptance.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Manufacturers:
  - 1. Bayer Corp: [www.nobugs.com](http://www.nobugs.com).
  - 2. FMC Professional Solutions: [www.fmcprosolutions.com](http://www.fmcprosolutions.com).
  - 3. Syngenta Professional Products: [www.syngentaprofessionalproducts.com](http://www.syngentaprofessionalproducts.com).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Toxicant Chemical: EPA (Title 7, United States Code, 136 through 136y) approved; synthetically color dyed to permit visual identification of treated soil.
- C. Diluent: Recommended by toxicant manufacturer.

### 2.2 MIXES

- A. Mix toxicant to manufacturer's instructions.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

- A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
- B. Verify final grading is complete.

### 3.2 APPLICATION

- 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:
  - D. Under Slabs-on-Grade.
  - E. At Both Sides of Foundation Surface.
  - F. Soil under walks and paving within 5 feet of the building perimeter.
  - G. Under slabs, apply toxicant immediately prior to installation of vapor barrier.
  - H. At foundation walls, apply toxicant immediately prior to finish grading work outside foundations.
  - I. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
  - J. Re-treat disturbed treated soil with same toxicant as original treatment.
  - K. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

### 3.3 PROTECTION

- A. Do not permit soil grading over treated work.

END OF SECTION

SECTION 321216 - ASPHALT PAVING

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. Cold milling of existing hot-mix asphalt pavement.
- 2. Hot-mix asphalt patching.
- 3. Hot-mix asphalt paving.
- 4. Hot-mix asphalt paving overlay.
- 5. Pavement-marking paint.

B. Related Sections:

- 1. Section 312000 — Earth Moving

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.

- 1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
- 2. Job-Mix Designs: For each job mix proposed for the Work.

- B. Material Certificates: For each paving material, from manufacturer.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Hot Mix Asphalt registered with and approved by authorities having jurisdiction or the North Carolina Department of Transportation.

- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the City of Concord and NCDOT for asphalt paving work.

- 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

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

## 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
  - 1. Tack Coat: Minimum surface temperature of 60 deg F.
  - 2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
  - 3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
- B. Pavement-Marking:
  - 1. Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials and 55 deg F for water-based materials, and not exceeding 95 deg F.
  - 2. Thermoplastic: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials and 55 deg F for water-based materials, and not exceeding 95 deg F. Install after asphalt has cured for 30 calendar days.

## PART 2 - PRODUCTS

### 2.1 AGGREGATES

- A. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- B. Fine Aggregate: ASTM D 1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
- C. Mineral Filler: ASTM D 242 or AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.
- D. Aggregate material to be produced within not more than 500 miles of the project site.
- E. Aggregate material shall conform to Section 400 of the SC DOT Standard Specifications.
- F. Aggregate source shall be approved by SC DOT Office of Materials and Research. Contractor is to be required to provide written documentation of current approval.

### 2.2 ASPHALT MATERIALS

- A. Asphalt Binder: PG 64-22 or PG 70-22 (see plan).

- B. Tack Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

## 2.3 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.
- B. Pavement-Marking Paint: MPI #32 Alkyd Traffic Marking Paint.
- C. Pavement-Marking Paint: MPI #97 Latex Traffic Marking Paint.
- D. Crosswalk Pavement-Marking Paint: WHITE-Thermoplastic pavement markings (Alkyd/Maleic) shall be per City of Atlanta and Section 653 of the GDOT standard specifications.
- E. Select from colors in subparagraph below. If more than one color is required, indicate locations of each on Drawings or by inserts.
- F. Glass Beads: AASHTO M 247, Type 1.

## 2.4 MIXES

- A. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and complying with the following requirements:
  - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
  - 2. Base Course: Refer to construction documents.
  - 3. Surface Course: Refer to construction documents

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

### 3.2 COLD MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.

1. Mill to a depth of 2 inches.

### 3.3 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseal concrete pieces firmly.
  1. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.
- C. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal/sq. yd.
  1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- D. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact to flush with adjacent surface.

### 3.4 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
- C. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal/sq. yd.
  1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

### 3.5 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.

1. Spread mix at minimum temperature of 250 deg F.
  2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### 3.6 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
1. Clean contact surfaces and apply tack coat to joints.
  2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
  3. Offset transverse joints, in successive courses, a minimum of 24 inches.
  4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

### 3.7 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.



- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.8 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - 1. Base Course: Plus or minus 1/2 inch.
  - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
  - 1. Base Course: 1/4 inch.
  - 2. Surface Course: 1/8 inch.
  - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

### 3.9 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow paving to age for 30 days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils.
  - 1. Broadcast glass beads uniformly into wet pavement markings at a rate of 6 lb/gal.

### 3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Replace and compact hot-mix asphalt where core tests were taken.

- C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.

END OF SECTION

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## SECTION 321817 - PICKLEBALL COURT SURFACE

## PART 1 – GENERAL

## 1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.
- B. References:
  - 1. National Asphalt Paving Association (NAPA)
  - 2. United States Tennis Association (USTA)
  - 3. International Tennis Federation (ITF)
  - 4. American Sport Builders Association (ASBA)  
(Former: US Tennis Court & Track Builders Assoc.)

## 1.2 DESCRIPTION OF WORK

- A. Base bid will be for Installation of 100% acrylic emulsion tennis (pickleball) surface over a prepared asphalt pavement base. Surface installation includes the court surface system, necessary coats of resurfacer, and multiple layers of textured color surfacer or "color coats." The work also includes all necessary graphics, markings and lines.
- B. The objective is to provide a properly drained surface without depressions exceeding acceptable tolerances. The surface must be a durable protective finish that is weather resistant, ultra-violet light resistant, and non-glare that results in a uniform texture and provides uniform speed of play. The color shall be long lasting and provide proper contrast for court delineation.

## 1.3 WORK INCLUDED IN THIS SECTION

- A. Patching and leveling of asphalt surface
- B. Coordination and installation of equipment such as nets, net posts, net straps, windscreens, fencing and concrete edging etc.
- C. Application acrylic playing surface (multiple coats)

## 1.4 RELATED WORK SPECIFIED ELSEWHERE

- A. SECTION 321216 – Asphalt Paving
- B. SECTION 323300 – Site Furnishings for the Pickleball Court Posts & Nets

## 1.5 QUALITY ASSURANCE

- A. The pickleball court contractor or sub-contractor must meet the following qualifications in order to be considered qualified to work on the project:

1. Must have built and completed five (5) projects of similar complexity and scope (asphalt, court surfacing equipment installation etc.) in each of the last five (5) consecutive years. It is also highly recommended that the contractor be a member of the ASBA (*Former: US Tennis Court & Track Builders Assoc.*) to add to their qualifications.
2. Each bidder shall employ at least two supervisory people with at least 5 years' experience each in the successful installation of pickleball courts. And have used laser technology including a laser controlled, hydraulically activated land plane and other specialized sports grading equipment if installing the base and asphalt for the project.
3. Surfacing shall conform to the guidelines of the ASBA for planarity.
4. All surface coatings products shall be supplied by a single manufacturer.
5. The contractor shall record the batch number of each product used on the site and maintain it through the warranty period.
6. The contractor shall provide the inspector, upon request, an estimate of the volume of each product to be used on the site.
7. The installer shall be an authorized applicator of the specified system.
8. The manufacturer's representative shall be available to help resolve material questions.

#### 1.6 SUBMITTALS

- A. The following information shall be submitted by the Contractors as requested by the Owner after the Contractor has been selected, but prior to installation of specified work:
  1. Installation process and requirements for the special materials and any conditions that may limit the installation or affect quality of installation.
  2. Material safety data sheets on all products, as necessary.
  3. Contractor to supply Owner with a one (1) gallon or other appropriate size sample of products for visual inspection and testing, if necessary.
  4. Manufacturer specifications for components, color chart and installation instructions.
  5. Authorized Applicator certificate from the surface system manufacturer.
  6. ITF classification certificate for the system to be installed.
  7. Reference list from the installer of at least 5 projects of similar scope done in each of the past 5 years.
- B. Prior to purchase and installation of any products all color selections for surface materials and equipment will be approved by the owner through the typical submittal process described herewithin.

## PART 2 – PRODUCTS

### 2.1 PICKLEBALL SURFACE SYSTEM MATERIAL

#### A. Pickleball Court Surfacing Materials

1. Base Bid Surface Material: Shall be as provided by the following manufactures or approved equal:
  2. DecoTurf (DecoColor system)  
Tom Magner  
North Reading, MA  
Phone 1-978-664-3244  
E-mail: [t.magner@decoturf.com](mailto:t.magner@decoturf.com)
  3. Plexipave Surfacing Systems (Plexipave Standard - ITF Category 3)  
Don Domino  
Parkland, Florida  
Phone: 954-856-8500  
E-mail: [d.domino@plexipave.com](mailto:d.domino@plexipave.com)
  4. Nova Sports USA (Novacrylic 4-Coat color system)  
6 Industrial Rd. Milford, MA, 01757  
Phone: (800)872.6682.  
E-mail: [info@novasports.com](mailto:info@novasports.com)

- B. All products must be pure acrylic containing no asphalt or tar emulsions, nor vinyl, alkyd pure non-acrylic resins. The color system shall be factory mixed compounds requiring only the addition of water at the job site except for the addition of specified sand where called for in the specifications. All materials shall be delivered to the job site in sealed containers with the manufacturer label affixed.

## PART 3 – EXECUTION

### 3.1 TOLERANCES AND RECOMMENDED CONSTRAINTS FOR THE ASPHALT SURFACE

#### A. Hot Mix Asphalt Tennis (Pickleball) Courts

##### 1. Slope Requirement:

All excavating, filling and grading requirements and compacting work of the sub-base should be performed so that the finished subgrade is 4"-6" above the surrounding ground and slopes not less than 0.83% (1:120) and not more than 1% (1:100). Each court must slope on a true plane as shown on the plans.

##### 2. Aggregate Base Course:

###### a. Material:

- 1) A base course have; crushed aggregate; or approved processed/recycled asphalt or processed/recycled concrete should be installed over the subgrade. The specified material should meet applicable, SCDOT and ASTM specifications.

Compacted thickness will be no less than the equivalent of 8" of thoroughly compacted crushed stone.

- b. Spreading and Compacting:
  - c. The material should be spread by methods and in a manner that produces a uniform density and thickness. The material thus spread should be compacted to 100% minimum Standard Proctor with equipment that provides uniform density. Each layer of material shall be sampled, tested, compacted, and approved prior to placing succeeding layers of base material or pavement.
  - d. No base material shall be placed on frozen subgrade or base, No base material shall be placed that will not be covered by a subsequent layer of the pavement structure during the same construction season. Any defects that may develop in the completed base course shall be acceptably repaired at no cost to the Owner.
  - e. Surface of the base course as compacted should not vary more than 1/2" from the true plane of the court.
  - f. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials
3. Intermediate Pavement Course:
- a. This hot plant mix should be spread and compacted by methods and in a manner that produces a uniform density and thickness. The finished intermediate course should not vary more than 1/4" in 10', when measured in any direction.
4. Asphalt Surface Course: (Same as Intermediate Pavement Course)
- a. A hot plant mix having a maximum aggregate size of 3/8" to 3/4" in accordance with SCDOT and ASTM specifications, or the Asphalt Institute should be constructed over the base course to a compacted thickness of not less than 1-1/2" as shown on the drawings.
5. General Description of Asphalt mix:
- a. A surface course of a hot plant mix having a maximum aggregate size of 3/4" and a minimum aggregate size of 1/4" should be constructed over the hot mix intermediate course to a compacted thickness of not less than 1-1/2". \*  
Suggested Mix Design (unless SCDOT is more stringent)

<u>Screen</u>	<u>% Passing</u>	* The proper type asphalt used for the surface course will vary from state to state if using the standard norm of the Department of Transportation (DOT) or State Highway Department standards. Local soil and climatic conditions also may impact the type of asphalt used.
3/4	100	
1/2	97-100	
3/8	90-100	
#4	70—95	
#8	58-82	
#30	20-50	
#100	6-20	
#200	2-10	

\*Thickness: Not less than 1"

Liquid Bitumen: Minimum 5.5% by weight.

- b. Aggregate Type: Crushed stone, gravel, shale, limestone, etc. Foreign materials, i.e., pyrite, clay, ferrous compounds, dirt and organic material are not acceptable.
- c. Cure Time: Minimum 14 days before application of playing surface.
- d. Voids Content: Minimum as specified by the Department of Transportation or State Highways Department, but in no case should void content exceed 7%.
- e. Recommended Spreading and Compacting (minimum procedures to use if SCDOT does not recommend greater performance)
- f. This hot plant mix should be spread and compacted by methods and in a manner that produces a uniform density and thickness. The composition of the final pavement shall be (3) three-inches of asphalt concrete placed in two (1-1/2) one and one-half inch courses.
- g. A one- & one-half-inch (1-1/2") leveling course shall be placed over the aggregate base, allowed to cure to the optimum moisture for compaction and thoroughly rolled with a power steel tandem roller, weighing from 2-4 tons. Compaction shall achieve 98-100% maximum density.
- h. A final one-inch wearing course shall be applied to the clean and finished leveling course in the same direction, as drainage will occur. This allows drainage to occur with the grain of the court rather than across the grain. Application shall attain the final required slope, pitch and grade, with no variations greater than specified below. After the mix has cured the surface course shall be thoroughly rolled with a powered steel tandem roller weighing 2-4 tons

6. Surface Tolerance

- a. The finished surface of the court should not vary more than 1/8" in 10' when measured in any direction.

3.2 ACRYLIC COLOR SURFACE SYSTEM PREPARATION AND APPLICATION

A. Preparation

1. New asphalt pavement shall cure for fourteen days and new concrete 30 days prior to application of any surfacing materials
2. The surface to be coated shall be inspected and made sure to be free of grease, oil, dust, dirt and other foreign matter before starting work.
3. The surface shall be flooded. Any ponding water remaining that is deep enough to cover the thickness of a five cent piece (nickel) shall be corrected using a patch mix consisting of Acrylic Resurface Patch mix consisting of 1 part Acrylic Resurface, 1-part #60-#100 mesh silica sand per the manufacturer's directions. Depressions may need primed with a 50% dilution of binder/primer as recommended by the manufacturer.

B. Court Surface Application

1. General Limitations to all surface coating applications
  - a. Apply Coatings only when ambient temperature is 50 degrees F. and rising.
  - b. Do not apply coatings when rain is imminent.
  - c. Insure proper disposal of empty containers and wash water.



- d. All ACRYLIC coatings are waterborne and cannot cure in cold temperatures or when subject to moisture. Care should be taken not to apply coatings when rain is forecast or sudden drop of temperature is expected. Climatic conditions such as very cool evenings and high dew points dictate that work should be completed early in the day so the coatings can be exposed to enough warm sunlight to form a film before sunset. The opposite applies during times of high heat, low humidity and drying breezes: under these conditions, work very early in the morning or very late in the day. If the product seems to be drying too fast in hot weather, mist the pavement with water to make the application easier. Care must be taken to allow each application to dry thoroughly prior to recoating.
2. Application shall proceed only if the surface is dry and clean and the temperature is at least fifty (50) degrees F. and rising and the surface temperature is not in excess of one hundred forty (140) degrees F. Do not apply coatings when rain is eminent.
3. Each coat in this system must dry completely before next application. Between each coat, inspect entire surface. Any defects should be repaired. Scrape surface to remove any lumps, and broom or blow off all loose matter.

#### C. Base Bid Acrylic Surface

1. Using a neoprene rubber squeegee, apply two (2) coats of acrylic resurfacer. Resurfacer shall be diluted with 30-gallons of clean water to each 55-gallons of resurface (approx. 1-part water 2 parts resurfacer). Clean-bagged sand shall be incorporated into the diluted resurface at the rate of 500-700 lbs. per 55 per gallons of undiluted resurfacer (min 10 lbs. per gallon Sand gradation shall be 60 to 100 meshes per manufactures recommendations and owners preference for speed of play. Allow application to dry thoroughly
2. Using a neoprene rubber squeegee, apply 2 coats of "colorcoat" concentrate material diluted per the manufacturer's recommendations (colors to be designated by owner) and allow to dry thoroughly. The quantity of water used in diluting these coatings may exceed the quantity specified by only a small amount and only if coatings are drying too rapidly. Permission of the owner shall be obtained before adding additional water
3. Using a neoprene rubber squeegee, apply one (1) coat of topcoat wearing surface (final color coat) such as Novacoat or equal, diluted one (1) part concentrated material to one (1) part clean water (colors to be designated by owner). Allow application to dry thoroughly. The quantity of water used in diluting these coatings may exceed the quantity specified by only a small amount and only if coatings are drying too rapidly. Permission of the owner shall be obtained before adding additional water.
4. Apply playing lines
  - a. All lines are to be applied by painting between masking tape with a paintbrush or roller according to U.S.T.A. specifications.
  - b. Prime masked lines with Seal A Line or other approved product and allow to dry.
  - c. Paint lines with White Line Textured line paint. Allow application to dry
  - d. Remove masking tape immediately after lines are dry.
  - e. Protect adjacent areas and structures (fences, posts, sidewalks, buildings, etc.) which are not to be coated. In the event that coatings are applied to above, remove immediately before drying is complete.

D. Completion

1. Upon completion, the contractor shall remove all construction debris, surplus materials, and empty containers and leave the site in a condition acceptable to the owner. The court is to be left secure so as to prevent vandalism.

3.3 COORDINATION OF NET AND NET POST EQUIPMENT AND OTHER FURNISHINGS

A. Coordination and Installation of other Work Items

1. All net post and ground sleeves, center strap anchors, and fence posts shall be in place and approved by the Owner prior to application of the finish course.

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## SECTION 321313 - SITE CONCRETE PAVEMENT

## PART 1 - GENERAL

## 1.1 GENERAL

- A. The work covered by this section shall consist of all sidewalks, footings, slabs, curbs, and any other concrete as defined on the plans.

## 1.2 STANDARDS

- A. American Concrete Institute:

1. ACI 211.1, "Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete".
2. ACI 301, "Specifications for Structural Concrete for Buildings".
3. ACI 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing concrete".
4. ACI 305, "Hot Weather Concreting".
5. ACI 306, "Cold Weather Concreting".
6. ACI 311 "Recommended Practice for Concrete Inspection".
7. ACI 315 Manual of Standard Practice for Detailing Reinforced Concrete Structure.
8. ACI 318, "Building Code Requirements for Reinforced Concrete".
9. ACI 330R-08, "Guide for the Design and Construction of Concrete Parking Lots".

- B. American Society for Testing and Materials:

1. ASTM C-33, "Specifications for Concrete Aggregates".
2. ASTM C-94, "Specifications for Ready-Mixed Concrete".
3. ASTM C-150, "Specification for Portland Cement".
4. ASTM C-231, "Air Content of Freshly Mixed Concrete by the Pressure Method".
5. ASTM C-260, "Specifications for Air-Entraining Admixtures for Concrete".
6. ASTM C-309, "Specifications for Liquid Membrane-Forming Compounds for Curing Concrete".
7. ASTM C-143, "Slump Measurement".
8. ASTM C-192, "Compression Test of concrete".
9. ASTM C-39, "Compression Test".

### 1.3 DELIVERY AND PROTECTION OF MATERIAL

- A. Cement shall be stored in a weather tight structure with the floor at least 12" off the ground and accessible for inspection in the original package.
- B. Fine and coarse aggregate shall be stored separately to assure segregation of sizes and to avoid inclusion of dirt and foreign materials in the concrete.
- C. Ready-mixed concrete shall be delivered in accordance with the requirements set forth in ASTM C 94.
- D. Reinforcing steel delivered to the job and not immediately placed in the forms shall be placed in racks or other supports at least 18" above the ground.

### 1.4 SHOP DRAWINGS

- A. The contractor shall prepare and submit to the engineer of record all placing plans, bending details, and bar lists covering all reinforcing steel supplied under this contract. All dimensions necessary to the checking of the reinforcing details shall be shown on shop drawings.
- B. The contractor shall be responsible for the conformation of all steel details to the typical and special details indicated on the design plans. Work must not proceed in the field before the contractor has received applicable approved drawings.
- C. All details and notes appearing on the contract drawings, and giving information for the placing of reinforcing steel, shall be shown also on the shop drawings, so that the steel can be properly placed without reference to other drawings or notes. Shop drawings will not be approved without such information.

### 1.5 FORMS

- A. Forms shall be set and maintained true to the required lines, grades, and dimensions. Forms shall be constructed with material of such strength and with sufficient rigidity to prevent any appreciable deflection between supports. Forms shall be mortar-tight and shall be filled at sharp corners when indicated on the drawings.
- B. Clamps, pins, metal spacers, anchorages, or other connecting devices shall be designed to hold the forms rigidly together. Any metal spacers or anchorages which are required within the forms shall be so constructed or installed that the metal work can be removed to a depth of at least one inch from the exposed surface of the concrete, without injury to the surface. The recess thus formed in the concrete shall have a diameter not greater than 1-2 times its depth.
- C. The shape, strength, rigidity, and surface smoothness of forms that are to be reused shall be maintained at all times. Forms shall be thoroughly cleaned of all dirt, mortar, and foreign material before being used.
- D. Before concrete is placed, all inside form surfaces shall be thoroughly coated with commercial-quality form oil or other equivalent coating.

- E. Wood forms shall have a smooth and uniform texture. Joints between forms shall be tight and even, so that no appreciable form marks remain after the forms are removed.
- F. Plywood sheets showing torn grain, worn edges, patches, or other defects which will impair the texture of concrete surfaces shall not be used on surfaces which will be exposed to view.
- G. Metal forms shall be of such thickness and rigidity that the forms will remain true to shape. Bolt and rivet heads shall be counter-sunk. Metal forms which do not present a smooth surface or line up properly shall not be used. Care shall be exercised to keep metal forms free from all foreign matter which will discolor the concrete.

#### 1.6 PORTLAND CEMENT

- A. The cement shall be Standard Portland Cement of American Manufacturer, Type 1, conforming to ASTM C-150. Cement reclaimed by cleaning bags or from leaking containers shall not be used. Each bag shall weigh approximately 94 pounds and shall contain one cubic foot.

#### 1.7 CONCRETE AGGREGATES

- A. Fine and coarse aggregate for concrete shall comply ASTM C-33 (concrete aggregate). Aggregate shall be clean and free from organic or toothier deleterious substances.
- B. Drying shrinkage of concrete specimens prepared and tested in accordance with ASTM Method C-157 and modified shall not exceed 0.07 percent.
- C. Prepare the concrete mix using one part Portland cement to six parts of combined aggregate, measured by dry loose volume using the same ratio of fine to coarse aggregate as is proposed for use in construction. Vibration shall not be used to consolidate the concrete, but the exposed surface of each specimen shall be steel-troweled.
- D. Cure the specimens to an age of seven days. At that age, remove the specimens from the moist room, measure for length, and store in a curing cabinet maintained at 100 plus/minus 2<sup>0</sup>F. with a relative humidity of 32 plus/minus 2 percent. After storage in the curing cabinet for 29 days, determine the change in length of each specimen to the nearest 0.0001 percent of the effective gage length. Report the average change in length of the drying shrinkage of the concrete.
- E. Fine coarse aggregate shall be furnished and batched separately. Bankrun sand and gravel mixtures shall not be used.
- F. Aggregates shall be sized and graded in accordance with ASTM C-33 with normal weight coarse aggregate, being not finer than ¾" to No. 4, nor coarser than 2" to No. 4.
- G. Maximum size of coarse aggregate:
  - 1. Three-fourth of minimum clear spacing between reinforcement or between reinforcement and form.

2. One-fifth of the narrowest dimensions between forms or the thickness of slabs or other flat work.

1.8 WATER

- A. Water shall be clean, taken from source suitable for domestic consumption.

1.9 CONCRETE MIX (Plant or Transit-Mix Required, no job site mixing allowed)

- A. Proportions of cement, fine and coarse aggregate and mixing water shall be selected to produce concrete of the required durability, workability and strength. Proportions shall follow the recommendations of the American Concrete Institute (ACI 214 normal weight concrete). The mixture shall be such that the concrete will work readily into corners and angles of forms and around reinforcement without segregation of materials or accumulation of excess free water on the surface.
- B. Contractor will Submit mix designs on each class, strength, and density of concrete for review and approval by the designer & or Owner's representative.
  - 1 All mix designs shall be established in accordance with Section 5.3, "Proportioning on Basis of Field Experience and/or Trial Mixtures" of ACI 318.
  - 2 Submitted mix designs must have an independent testing laboratory or SCDOT test documentation acceptable to the Architect and/or Owners Representative.
  - 3 All mixes must have accompanying compression and shrinkage tests data in order to be reviewed for approval
- C. Mixing and placing of concrete shall conform with ACI 304-73 "ACI STD and ACI 211. Recommended Practice for Measuring, and Mixing and Placing Concrete." Concrete installed in freezing weather shall be mixed and placed in accordance with ACI 306-66 "ACI STD. Recommended Practice for Cold Weather Concreting.

1.10 SLUMP

- A. Slump shall not exceed:

<u>Location/Type</u>	<u>Maximum</u>	<u>Minimum</u>
Pavements and Mass Construction	3"	1"
Plain footings and walls	4"	1"
Reinforced footings and walls	5"	2"
Slabs, walls (above grade), etc.	6"	3"

- B. Mechanical vibrators should always be used, except on flat slabs.

1. Standard test ASTM C-143 shall be used to measure slump.

1.11 MINIMUM COMPRESSIVE STRENGTH

- A. Concrete shall have a minimum compressive strength, at 28 days of a least the design strength of the particular use note on the plans and details, but not less than 3,600 psi unless otherwise specified elsewhere in the plans or specifications.

- B. These minimum compressive strength values are established to obtain adequate resistance to weathering, weather-tightness, wear resistance and workability as well as for minimum strength requirements.

#### 1.12 RE-TEMPERING

- A. Retempering of concrete that has been partially hardened by addition of water or cement is not acceptable.

#### 1.13 PREPARATION FOR PLACING

- A. Concrete shall not be placed on earth until the fill or excavation has been prepared as set forth under the applicable sections of the specifications for that work.
- B. Before placing any concrete, all pipes or embedded items shall be in place and shall have received the required tests and the installations approved by the A&E.
- C. Concrete shall not be placed in forms until the framework has been approved by the designer, and all debris, wood shaving, and other matter have been removed from the forms, and the reinforcing steel is in proper condition for the placement of concrete.
- D. Hardened, or partially hardened, concrete on the forms or the reinforcement shall be removed before placing concrete.

#### 1.14 PLACING

- A. Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to re-handling or flowing. No concrete that has partially hardened or that has been contaminated by foreign material shall be deposited on the work, nor shall re-tempered concrete be used. In no case shall concrete be used when the elapsed time after the addition of water and cement to batch exceeds 45 minutes.
- B. When concreting is started, it shall be carried on as continuous operation until the placing of the area or section is completed. The top surface shall be finished to a true plane. When construction joints are necessary, they shall be made in accordance with the applicable sections of the specifications for construction joints.
- C. All concrete shall be thoroughly compacted by suitable means during the operation of placing, and shall be thoroughly worked around reinforcement, embedded fixtures and into the corners of the forms. When vibration is used, it shall be applied directly to the concrete, unless otherwise approved by the engineer/architect.

#### 1.15 TOLERANCES

- A. Conform to the tolerances for concrete noted in ACI 301 and the special project tolerance requirements listed below. Where two requirements conflict comply with the more stringent.
  - 1. Linear and Vertical Lines (when forms are stripped):
    - a. Slab edges:  $\pm 3/8$ " established lines



2. Plumb (when forms are stripped, except as otherwise specified):
  - a. Perimeter corners:  $\pm 1/4$ ".
3. Elevations (when forms are stripped, except as otherwise specified for track curb or trench drains):
  - a. Top of slab at perimeter edge:  $\pm 1/4$ " of established elevations before forms are stripped.
4. Level: Finish slabs to  $\pm 1/86$ " in 10 feet.

#### 1.16 COLD WEATHER PRECAUTIONS

- A. Adequate equipment shall be provided for heating the concrete materials and protecting the concrete during freezing weather. No frozen materials or materials containing ice shall be used.
- B. All concrete materials and all reinforcement, forms, fillers, and ground with which the concrete is to come in contact shall be free from frost. Whenever the temperature of the surrounding air is below  $40^{\circ}\text{F}$ , or expected to fall below  $40^{\circ}\text{F}$ , within 24 hours, all concrete placed in forms shall have a temperature of  $70^{\circ}\text{F}$ , and  $80^{\circ}\text{F}$ , and adequate means shall be provided for maintaining a temperature of not less than  $70^{\circ}\text{F}$  for three days, or  $50^{\circ}\text{F}$  for five days, or for as much more time as necessary to insure proper curing of the concrete. No dependence shall be placed on salt or other chemicals for the prevention of freezing.

#### 1.17 WARM WEATHER PRECAUTIONS

- A. When concrete is to be placed in temperatures above  $85^{\circ}\text{F}$ , special precautions shall be taken. The mixing time shall be held to a minimum as shall the time between mixing and placement. Forms, reinforcing, subgrade, and the surrounding area shall be sprinkled with cold water. Under extreme conditions the engineer/architect may require the mixing water be cooled and the aggregates sprayed with cold water.
- B. An admixture to retard hardening equal to Pozzolan-Retarder as produced by Master Builders may be used with the approval of the engineer/architect.
- C. During the curing period exposed surfaces shall be carefully protected from drying. Water should be applied to formed surfaces while forms are still in place.

#### 1.18 CURING AND PROTECTION

- A. All freshly placed concrete shall be adequately protected from damage or injury due to water, falling objects, persons, or anything that may mar or injure the finish surface of the concrete. Any surfaces that are damaged due to lack of protective measures shall be removed and replaced with fresh concrete at the expense of the contractor. Fresh concrete placed in the vicinity of public traffic shall be adequately protected with barriers, lights, and other protective measures necessary.
- B. Concrete shall be maintained in the moist condition for at least five days after placement.

## 1.19 CONSTRUCTION JOINTS EXPANSION JOINTS AND MECHANICAL

- A. Construction joints shall occur at section of minimum shear. Where a construction joint is to be made, the concrete shall be cleaned of foreign matter and laitance. In addition to the foregoing, joints shall be moistened with water and slushed with mortar consisting of one part of Portland Cement to one part of clean sharp sand immediately before placing of new concrete.
- B. Expansion joints shall be installed as indicated on the drawings and where concrete slabs on earth abut a vertical surface. Expansion joints shall be two inches thick asphalt impregnated fiber strips, or as indicated on the plans.
- C. Welded wire mesh shall be ASTM A 185, welded steel wire fabric, flat sheet only: Size shall be as noted per plans.

## 1.20 STANDARD FINISHES

- A. Standard Finishes:
  - 1. After striking-off and consolidating concrete, smooth the surface by screening and floating. Use hand methods only where mechanical floating is not possible. Adjust the floating to compact the surface and produce a uniform texture.
  - 2. After floating, test surface for trueness with a 10-foot straightedge. Distribute concrete as necessary to remove surface irregularities, and refloat repaired areas to provide a continuous, smooth finish.
  - 3. Work edges of slabs and formed joints with an edging tool, and round to 2 inch radius, unless otherwise shown. Eliminate tool marks on concrete surface.
  - 4. After completion of floating and when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
    - a. General: Broom finish, by drawing a hair broom across concrete surface, perpendicular to line of traffic.
    - b. On inclined slab surfaces, provide a coarse, non-slip finish by scoring surface with a stiff-bristled broom.
  - 5. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by architect.

END OF SECTION

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## SECTION 321713 - PARKING BUMPERS

## 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. Precast concrete wheel stops.

## 1.3 ACTION SUBMITTALS

- A. Product Data:
  - 1. Precast concrete wheel stops.

## PART 2 - PRODUCTS

## 2.1 PARKING BUMPERS

- A. Precast Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete; **[4000-psi]** minimum compressive strength; **[4-1/2 inches high by 9 inches wide]** by **[72 inches]** long. Provide chamfered corners and a minimum of **[two]** factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.
  - 1. Source Limitations: Obtain wheel stops from single source from single manufacturer.
  - 2. Surface Appearance: Smooth, free of pockets, sand streaks, honeycombs, and other obvious defects. Corners shall be uniform, straight, and sharp.
  - 3. Mounting Hardware: Galvanized-steel **[spike or dowel, 1/2-inch diameter, 14-inch minimum length]** or **[hardware as standard with wheel-stop manufacturer]**.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verify that pavement is in suitable condition to begin installation in accordance with manufacturer's written instructions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install wheel stops in accordance with manufacturer's written instructions unless otherwise indicated.

END OF SECTION

## SECTION 321723 - PAVEMENT MARKINGS

## 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. Painted markings applied to asphalt paving.
  - 2. Painted markings applied to concrete surfaces.

## 1.3 ACTION SUBMITTALS

- A. Product Data: Include technical data and tested physical and performance properties.
  - 1. Pavement-marking paint, alkyd.
  - 2. Pavement-marking paint, solvent-borne.
  - 3. Pavement-marking paint, acrylic.
  - 4. Pavement-marking paint, latex.
  - 5. Glass beads.
- B. Shop Drawings:
  - 1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
  - 2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

## 1.4 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of City of Concord and North Carolina Department of Transportation for pavement-marking work.
  - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

## 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of [**40 deg F for alkyd materials**] or [**55 deg F for water-based materials**], and not exceeding **95 deg F**.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain pavement-marking paints from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in [**the USDOJ's "2010 ADA Standards for Accessible Design"**].

### 2.3 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint, Alkyd: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, [**Type N**]; colors complying with FS TT-P-1952F.
  - 1. Color: [**White**]
- B. Pavement-Marking Paint, Solvent-Borne: MPI #32, solvent-borne traffic-marking paint.
  - 1. Color: [**White**]
- C. Pavement-Marking Paint, Acrylic: Acrylic, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952F, Type II, with drying time of less than [**three**] minutes.
  - 1. Color: [**White**]
- D. Pavement-Marking Paint, Latex: MPI #97, latex traffic-marking paint.
  - 1. Color: [**White**]

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that pavement-marking substrate is dry and in suitable condition to begin pavement marking in accordance with manufacturer's written instructions.
- B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

### 3.2 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow asphalt paving or concrete surfaces to age for a minimum of [30] days before starting pavement marking.
- C. Sweep and clean surface to eliminate loose material and dust.
- D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of [15 mils].
  - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to asphalt paving or concrete surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.

### 3.3 PROTECTING AND CLEANING

- A. Protect pavement markings from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION



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## SECTION 323300 - SITE FURNISHINGS

## 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 GENERAL

- A. The contractor shall furnish all materials, equipment, and labor necessary to perform all work under this heading as indicated on the drawings and required by the specifications. This section does not include the playground nor splash pad equipment. Refer to drawings.

## 1.3 QUALITY ASSURANCE

- A. Product Requirement: Each product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly and presently manufacturing products as specified. Additional or better features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product shall be included in the product
- B. Equipment / product manufacturers are listed in table 1.6 (of this section) for the convenience of the contractors during the bidding process and in no way restrict the submittal of equivalent quality products. They are the basis of design for the given product. This section cites examples that are used only to denote the quality standard of product desired and that they do not restrict bidders to a specific brand, make, manufacturer or specific name; that they are used only to set forth and convey to bidders the general style, type, character and quality of product desired; and that equivalent products will be acceptable.
- C. Field Measurements: Obtain field measurements where possible to ensure proper fitting of the work.
- D. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in walls and partitions for the installation of miscellaneous item work. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery of miscellaneous items with work of other trades to avoid delays.
- E. Shop Assembly: Preassemble items in the shop to the greatest extent possible. Disassemble units only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinate installation.

## 1.4 SUBMITTALS

- A. Product Data: Submit copies of manufacturer's detailed materials and fabrication specifications and installation instructions. Include catalog cuts of hardware, anchors, fastenings, and other data as required. Indicate by transmittal form that copy of each instruction has been distributed to the installer.

B. SHOP DRAWINGS

1. Include large scale plans, elevations and sections of each item specified, clearly showing gauges, finishes of materials, and methods used to secure work to adjacent construction..
2. Submit proposed manufacturer’s catalog cuts.
3. Clearly show the work to be performed by other trades.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to the site ready for use in the approved manufacturer’s original and unopened containers and packaging, bearing labels as to type and brand. Delivered materials shall be identical to approved samples.
- B. Storage: Store materials under cover in a dry and clean location, off the ground. Remove materials which are damaged or otherwise not suitable for installation and replace with acceptable materials.

1.6 SCHEDULE OF MISCELLANEOUS SITE ITEMS

		<b>EQUIPMENT LIST</b>			
<b>Quantities</b>		<i>Equipment to be installed per manufacturers specifications unless otherwise noted below or on drawings.</i>			
<b>Base Bid</b>	<b>Add Alternate</b>	<b>Item</b>	<b>Model No.</b>	<b>Basis of Bid - Suggested Manufacturer</b>	<b>Comments &amp; Provider</b>
25		6’ Rolled Formed Diamond Benches w/Center Arm (6 in ground for playground area, 1 in ground near event lawn, 6 portable at pickleball, and remaining surface mounted)	RF72D	Leisure Craft Inc. Ph (800) 633-8241  <a href="https://leisurecraftinc.com/product/roll-formed-diamond-bench/">https://leisurecraftinc.com/product/roll-formed-diamond-bench/</a>	11 Gauge steel construction with thermoplastic finish. Final color to be picked by Owner- for bidding purposes, basis of bid is BLACK. Locations to be approved by Architect/Owner <b>Provided By: Owner</b>
4 base bid	2 for ADD Alt # 1	6 ft Park Bench, Wood Grain Recycled Plastic w/Center Arm	Du Mor Bench 34-60TX (S-1/S-4)	Carolina Parks and Play Recreational Products Ph (877) 686-9188  <a href="https://dumor.com/products/bench-34">https://dumor.com/products/bench-34</a>	All Steel Members coated w/ Zinc Rich Epoxy then finished w/ Polyester Powder Coating (BLACK). Both S-1 Embankment and S-4 Subfloor mounting options are required depending upon location of bench. Locations to be approved by Architect/Owner. <b>Provided By: Owner</b>

4		A set of 32 Gallon Diamond Trash & Recycling Bins With Doors (6" high mount # B100 surface mount)	NA	Leisure Craft Inc. Ph (800) 633-8241  <a href="https://leisurecraftinc.com/product/32-gal-personalized-diamond-trash-recycling-bins-with-doors/">https://leisurecraftinc.com/product/32-gal-personalized-diamond-trash-recycling-bins-with-doors/</a>	11 Gauge steel construction with thermoplastic finish. Final color to be picked by Owner- for bidding purposes, basis of bid is BLACK for trash bin and BLUE for recycle bin. Locations to be approved by Architect/Owner <b>Provided By: Owner</b>
4		32 Gallon Diamond Receptacle (22" In-Ground Mount # B200)	NA	Leisure Craft Inc. Ph (800) 633-8241  <a href="https://leisurecraftinc.com/product/32-gallon-diamond-receptacle/">https://leisurecraftinc.com/product/32-gallon-diamond-receptacle/</a>	11 Gauge steel construction with thermoplastic finish. Final color to be picked by Owner- for bidding purposes, basis of bid is BLACK. Locations to be approved by Architect/Owner <b>Provided By: Owner</b>
6		32 Gallon Diamond Receptacle (6" high mount # B100 surface mount)	NA	Leisure Craft Inc. Ph (800) 633-8241  <a href="https://leisurecraftinc.com/product/32-gallon-diamond-receptacle/">https://leisurecraftinc.com/product/32-gallon-diamond-receptacle/</a>	11 Gauge steel construction with thermoplastic finish. Final color to be picked by Owner- for bidding purposes, basis of bid is BLACK. Locations to be approved by Architect/Owner <b>Provided By: Owner</b>
10		Classic Inverted U Bike Rack- Surface Mount	12700	Cyclesafe Ph (888) 950-6531  <a href="https://cyclesafe.com/bike-parking/bike-racks/classic-bike-u-rack/">https://cyclesafe.com/bike-parking/bike-racks/classic-bike-u-rack/</a>	Power Coated Traffic Black, RAL 9017 <b>Provided By: Contractor</b>
6		Harbor bollard, 6" straight permanent	HRE-6	Keystone Ridge Design (800) 284-8208  <a href="https://www.keystonridgedesigns.com/products/ProductDetail.aspx?prodid=709">https://www.keystonridgedesigns.com/products/ProductDetail.aspx?prodid=709</a>	Contractor is to install per detail and as per manufacturers specifications-concrete footing. Final color to be picked by Owner- for bidding purposes, basis of bid is YELLOW. Locations to be approved by Architect/Owner <b>Provided By: Contractor</b>

5		Belson Outdoors Collapsible Bollard	BCB-30	Belson Outdoors (800) 323-5664  <a href="https://www.belson.com/Collapsible-Bollards?srsId=AfmBOooJmC1JsmXmTASCY9as6MucecA_vavgeEnnQwrs80icXOdbrybM">https://www.belson.com/Collapsible-Bollards?srsId=AfmBOooJmC1JsmXmTASCY9as6MucecA_vavgeEnnQwrs80icXOdbrybM</a>	Contractor is to install per detail and as per manufacturers specifications- concrete footing. Final color to be picked by Owner- for bidding purposes, basis of bid is YELLOW. Locations to be approved by Architect/Owner <b>Provided By: Owner</b>
9		Pet Station (Sign/Bags/Trash Bin)	1003A-L	Dogipot Ph (800) 364.7681  <a href="https://dogipot.com/pet-stations/">https://dogipot.com/pet-stations/</a>	Locations to be approved by Architect/Owner <b>Provided By: Owner</b>
6 sets		Pickleball Net and Posts (Edwards 3" Classic)	1371705/1393 373-PKG	Pickleball Court Supply Ph (877) 504-5657  <a href="https://www.pickleballcourtsupply.com/Edwards_c_226.html">https://www.pickleballcourtsupply.com/Edwards_c_226.html</a>	Black Post with ground sleeves (3" OD – pair) with 36" height net with Net center strap and tie down - turnkey system & installation. <b>Provided By: Contractor</b>
No base bid	4 for ADD Alt # 2	Basketball Goal Rim	# 41	PW Athletics Ph (866) 821-6166  <a href="https://pwathletic.com/product/?group=Basketball&amp;product=Basketball+Rim&amp;filter=">https://pwathletic.com/product/?group=Basketball&amp;product=Basketball+Rim&amp;filter=</a>	Breakaway Extra Heavy-Duty Double Rim with Universal Plate <b>Provided By: Contractor</b>
No base bid	4 for ADD Alt # 2	Basketball Backboard	# 30	PW Athletics Ph (866) 821-6166  <a href="https://pwathletic.com/product/?group=Basketball&amp;product=Basketball+Backboard&amp;filter=">https://pwathletic.com/product/?group=Basketball&amp;product=Basketball+Backboard&amp;filter=</a>	36" H x 54"W, Solid Metal, Aluminum, Rectangular, Non-Perforated. <b>Provided By: Contractor</b>
No base bid	4 for ADD Alt # 2	Basketball Goal Post	1541P	PW Athletics Ph (866) 821-6166  <a href="https://pwathletic.com/product/?group=Basketball&amp;product=Basketball+Post&amp;filter=Gooseneck+Post">https://pwathletic.com/product/?group=Basketball&amp;product=Basketball+Post&amp;filter=Gooseneck+Post</a>	Gooseneck Post 5-9/16"O.D., offset, Powder coated with # 510 Black color <b>Provided By: Contractor</b>

1		Outdoor Messaging Kiosk Board		Bright Idea Shops, LLC Ph (330) 701-7879  <a href="#">Outdoor Message Centers   Order Outdoor Community Message &amp; Information Center Signs and Displays - Bright Idea Shops</a>	Medium Message Center - 1 Sided/1 Post 8', Viewing area: 32.125 x 20, Black HDPE Recycled plastic. Locations to be approved by Architect/Owner <b>Provided By: Owner</b>
3		Pet Fountain (only)	# 300 SMSS	Most Dependable Fountain Ph (901) 867-0039  <a href="https://www.mostdependable.com/product/300-smss/">https://www.mostdependable.com/product/300-smss/</a>	Black color fountain with surface carrier, recessed hose bibb and lock door and seasonal cover. Locations to be approved by Architect/Owner <b>Provided By: Contractor</b>
4		Double Water Fountain with Pet Fountain Option	# 440 SMFA	Most Dependable Fountain Ph (901) 867-0039  <a href="https://www.mostdependable.com/product/440-smfa-smssfa-w-optional-pet-fountain/">https://www.mostdependable.com/product/440-smfa-smssfa-w-optional-pet-fountain/</a>	Black color fountain with surface carrier, with pet fountain option, with jug filler and recessed hose bibb and lock door. Locations to be approved by Architect/Owner <b>Provided By: Contractor</b>

*The above list may not include all of the furnishings for the project. Refer to the other sections of the project manual. The Contractor shall include in his base bid the cost for pick-up, assembly, and installation of all materials as listed above.*

1.7 FABRICATION

A. WORKMANSHIP

1. Fabricated materials specified herein shall be products of the approved manufacturer, and fabricated in accordance with the review shop drawings and other submittals.
2. Execute work using skilled workmen, in strict accordance with the instructions and recommendations of the approved manufacturer.
3. Installed work shall be securely and neatly set in place at designated locations in the building free from scratches, mars, and other defects and shall be protected by adequate means to prevent damage at all times. Work which becomes damaged or marred prior to approval shall be replaced or repaired as approved by the Landscape Architect or Owner, at no additional cost to Owner.
4. Clean or polish work so it is free from dirt, grease, grime and foreign materials.

## 1.8 INSTALLATION

- A. General: In accordance with Drawings, details, and manufacturer's printed installation instructions. Items shall be accurately located, carefully plumbed and leveled, and securely and rigidly attached and reinforced as necessary. Use item manufacturer's standard mounting devices as best suited to installation conditions. All attachments shall be by mechanical means. Provide concealed grounds and backing where necessary.
  - 1. Installation of each product shall be by experienced mechanics capable of installing each item in accordance with the drawings and specifications, the shop and erection drawings and the manufacturer instructions.
  - 2. Set work accurately, in alignment and where shown. Items shall be plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
- B. Anchorages: Provide anchoring devices and fasteners as shown and as necessary for securing each item to building construction. Power actuated drive pins shall not be used.
  - 1. Where types, size or spacing of fastenings is not shown or specified, submit shop drawings showing proposed fastenings and methods of installation. Wood ground strips are not approved for anchoring.

## 1.9 CLEANING AND ADJUSTING

- A. Cleaning: After installation, all items shall be cleaned as recommended by the manufacturer and protected from damage until completion of the project.
  - 1. Spot prime all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming. Touch up all abraded and damaged areas of finish coat with paint furnished by the manufacturer.
- B. Adjustment: All movable parts including hardware shall be cleaned and adjusted to operate as designed without binding or deformation of the members, to be centered in the opening or frame, and where applicable, to have all contact surfaces fit tight and even without forcing or warping the components.

END OF SECTION

## SECTION 329200 -TURF AND GRASSES

## 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. Seeding.
  - 2. Sodding.
- B. Project conditions and requirements vary, thus precluding the absolute adherence to the items identified herein in all cases. However unless adequate written justification is provided, then it is expected that these guidelines will govern the design and specifications.
  - C. Seeding is required in all bare and disturbed areas inside the Limits of Construction within the grading limits and other areas disturbed by the Contractor.
  - D. The Contractor shall adapt his/her operations to variations in weather and soil conditions as necessary for the successful establishment and growth of the grasses.

## 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Material Test Reports: For existing surface soil and imported topsoil.
- C. Maintenance Instructions: Recommended procedures to be approved by Owner for maintenance of lawns during a calendar year. Submit before expiration of required maintenance periods.

## 1.4 QUALITY ASSURANCE

- A. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
  - 1. Report suitability of topsoil for lawn growth. State recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.
- B. The Owner and Landscape Architect shall review and approve of all seed/sod bed preparation prior to installation of seed or sod.



### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
- B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.

### 1.6 SCHEDULING

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
  - 1. Spring Planting: March 1-June 1 \*\*
  - 2. Fall Planting: September 1-November 1.\*\* Sod/Seed installation outside this period requires that temporary irrigation be operable and the approval of the Owner.

### 1.7 LAWN MAINTENANCE (SEE SECTION 3.4 FOR FURTHER INFORMATION)

- A. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:
  - 1. Seeded Lawns: 60 days from date of Substantial Completion.
    - a. When full maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.
  - 2. Sodded Lawns: 60 days from date of Substantial Completion.
  - 3. Repaired Lawn Areas (less than 5,000 sf disturbed) – upon acceptance of final project
- B. Mowing: The Contractor shall conduct mowing operations to keep the lawn in a neat and well groomed appearance until final acceptance of the work. The lawn shall only be cut when grass and soil are dry. Not more than 1/3 of the total leaf surface is to be removed at one mowing. It is not necessary to remove clippings if grass is mowed according to these specifications. Prior to acceptance, a final mowing shall be conducted.
  - 1. Mowing for Fescue shall be done with rotary type mower set at 3 inches. Zoysia should be cut at 1-1/2 to 2" inches. Mow lawn as soon as top growth is tall enough to cut (max 4-1/2" for fescue and 2" for Zoysia). Schedule initial and subsequent mowing to maintain the aforementioned grass height.
- C. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before

each application is performed.

## PART 2 - PRODUCTS

### 2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Grass Seed Mix:
  - 1. Full Sun: (Owners choice depending on location and time)
    - a. Cool Season Mix= Tall Fescue Blend a minimum of three cultivars.
    - b. Warm Season Grass Mix= Bermuda seed blend (min. three cultivars. (modify for seasonal application of crop seeds with approval of Owner)
  - 2. Sun and Partial Shade: Proportioned by weight as follows:
    - a. 85 percent Tall Fescue Blend
    - b. 5 percent chewings red fescue (*Festuca rubra* variety).
    - c. 10 percent southern heat tolerant Kentucky bluegrass (*Poa pratensis*).
  - 3. Shade: Proportioned by weight as follows:
    - a. 85 percent Tall Fescue Blend
    - b. 10 percent chewings, creeping red fescue (*Festuca rubra* variety).
    - c. 5 percent southern heat tolerant Kentucky bluegrass (*Poa pratensis*).
- C. All turf grass and seed sources and grassing subcontractors must be listed by the contractor and approved by the Landscape Architect or Owner.

### 2.2 TURFGRASS SOD

- A. Turfgrass Sod: Certified Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, complying with TPI's "Specifications for Turfgrass Sod Materials" in its "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
- B. Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:
  - 1. Hybrid Zoysia sod approved by Landscape Architect or Owner
- C. All turf grass and seed sources and grassing subcontractors must be listed by the contractor and approved by the Landscape Architect or Owner. Refer to the Drawings for location of seed and or sod.

### 2.3 TOPSOIL

- A. Topsoil: Native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site or hauled onto the site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones,

clay lumps, and other extraneous materials harmful to plant growth. Minimum requirement for topsoil shall meet ASTM D 5268, pH range of 5.5 to 7, a minimum of 6 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. To be approved by Landscape Architect or Owner.

- B. Supplement soil for turf areas with approved planting soil mix (see below) when 4" depth cannot be attained with onsite approved soil.

## 2.4 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural limestone containing a minimum 80 percent calcium carbonate equivalent and as follows:
  - 1. Class: Class O, with a minimum 95 percent passing through No. 8 (2.36-mm) sieve and a minimum 55 percent passing through No. 60 (0.25-mm) sieve.
  - 2. Apply limestone at rate determined by soil test or for small areas at a rate of 3,300 pounds per acre (75lbs/1000).
- B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, with a minimum 99 percent passing through No. 6 sieve and a maximum 10 percent passing through No. 40 sieve.

## 2.5 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
  - 1. Organic Matter Content: 50 to 60 percent of dry weight.
- B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.
- C. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

## 2.6 FERTILIZER

- A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10 percent phosphoric acid.
- B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
  - 1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.
  - 2. Apply fertilizer rates determined by soil test or for small areas at a rate of 40 pounds per acre (75lbs/1000) Standard analysis is 5-10-10

- C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
  2. Apply fertilizer rates determined by soil test or for small areas at a rate of 40 pounds per acre (75lbs/1000) Standard analysis is 5-10-10

## 2.7 MULCH

- A. Shall be weed-free grain straw. Quantity shall be 3,300 pounds per acre (approximately 75 pounds per 1000 square feet) or 65 bales per acre (1-1/2 bales per 1000 square feet).

## 2.8 PLANTING SOIL MIX

- A. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 6 percent organic material content from existing, native surface when possible. Verify suitability of soil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. To be approved by Owner.
- B. Planting Soil Mix: Consult Owner for approval.

## PART 3 - EXECUTION

### 3.1 LAWN PREPARATION

- A. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
1. Apply superphosphate or other soil amendments & fertilizer directly to subgrade as directed from the soil analysis.
  2. Thoroughly blend planting soil off-site before spreading OR spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
  3. Spread planting/top soil to a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
- B. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface soil stripping operations, prepare surface soil as follows:
1. Loosen surface soil to a depth of at least of 4 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches of soil.
  2. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.

- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
- D. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Before planting, obtain Owner and Landscape Architect or Engineer's acceptance of finish grading and seed bed preparation; restore planting areas if eroded or otherwise disturbed after finish grading.

### 3.2 SEEDING

- A. Sow seed at the following rates
  - 1. Cool Season Mix- Fescue Blend at 7-8 lb/1000 sq. ft. (exact number to be determined by approved mixture)
  - 2. Warm Season Mix- Bermuda Blend at 2.5-3 lb/1000 sq. ft. (exact number to be determined by approved mixture)
- B. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- C. Protect seeded areas from hot, dry weather or drying winds by applying approved compost mulch and/or planting soil within 24 hours after completing seeding operations. Soak areas, scatter mulch/soil uniformly to a thickness of 3/8", and roll surface smooth.
- D. Soil shall be with moist but not wet and broadcast by means which will insure uniform distribution and thorough coverage of the entire area. Seed shall be covered lightly (1/4") and rolled with a light roller or cultipacker to firm the seed in the soil.
- E. All seeded areas shall be mulched, unless otherwise directed by the Landscape Architect. Mulch shall be applied to the area evenly and lightly.
- F. Mulch shall be applied within 36 hours after the completion of seeding, unless otherwise permitted by the Landscape Architect. Care shall be exercised to prevent displacement of soil or seed or other damage to the seeded area during the mulching operations. Mulch shall be uniformly spread by hand or by approved mechanical spreaders or blowers which will provide an acceptable application. An acceptable application will be that which will allow some sunlight to penetrate and air to circulate, but also partially shade the ground, reduce erosion, and conserve soil moisture.
- G. When there are seasonal limitations on seeding or when other weather or erosion conditions make it desirable to mulch in advance of seeding, the Landscape Architect may direct that mulch be applied after the application and incorporation of limestone into the seed bed and the fertilizer and seed then be applied later, through the mulch in proper season or under more favorable weather conditions.
- H. Mulch shall be held in place by applying a sufficient amount of approved binding material to assure that the mulch is properly held in place. The rate and method of applications of

binding material shall meet the approval of the Landscape Architect. Where the binding material is not applied directly with the mulch, it shall be applied immediately following the mulch application.

- I. The contractor shall take sufficient precautions to prevent mulch from entering drainage structures through displacement by wind, water, or other causes and shall promptly remove any blockage to drainage facilities which may occur.
- J. Areas that do not show a prompt "catch" or have been washed shall be reseeded for thorough coverage.

### 3.3 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy
- B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
  - 1. Lay sod across angle of slopes exceeding 1:3.
  - 2. Anchor sod on slopes exceeding 1:6 only with anchors (pegs/staple) approved by Owner. Anchors to be spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
- C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

### 3.4 TURF MAINTENANCE

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
- B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings (see Part 1, Subsection 1.6 for heights).
- C. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

3.5 INSPECTION AND ACCEPTANCE

- A. Samples of all materials are required by the Owner. Only upon approval of samples may delivery of materials begin and may work proceed.
- B. Lawns will be considered for Final Acceptance only in conjunction with final acceptance of all other work performed under this Contract and are guaranteed under the terms of the Contract.

3.6 SATISFACTORY LAWNS

- A. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities. The contractor shall guarantee a live stand of permanent grass consisting of 95% coverage minimum for seeded grass with no bare spots greater than 1 square foot. Acceptance will be made after the grass has been mowed at least twice by the Contractor and shows sufficient stand and cover as specified.
- B. Reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

END OF SECTION

## SECTION 329300 -EXTERIOR PLANTS

## PART 1 - GENERAL

## 1.1 GENERAL

- A. The work required under this Section consists of all preparation, planting, and related items necessary to complete the work indicated as described in the Specifications, in addition to supplying all plants specified and shown on the Drawings.

## 1.2 APPLICABLE STANDARDS

- A. Tree and Shrub Transplanting Manual, latest edition. International Society of Arboriculture.
- B. American Standard for Nursery Stock, latest edition. American Association of Nurserymen, Inc.
- C. Standardized Plant Names, Second Edition, 1942. American Joint Committee on Horticulture Nomenclature.
- D. Guide for Establishing Values of Trees and Other Plants, International Society of Arboriculture, Revision IV, June, latest edition.
- E. National Arborist Association Standards, latest edition.
- F. Hardiness zones 6, 7, 8, as defined by the Arnold Arboretum Hardiness Map of May 1, 1967.

## 1.3 SUBSTITUTIONS

- A. The species or varieties, materials, products or sizes specified herein by botanical and common name shall be provided as specified. Substitutions will be permitted only upon written application by the Contractor to the A&E and when approved by said A&E in writing. Request for permission to substitute will not be entertained, unless adequate evidence substantiating the non-availability of the specified time accompanies the request for substitution.
- B. If proof is submitted, and substantiated in writing, that any plant specified is not obtainable, a proposal will be considered for use of the nearest available size or similar variety with a corresponding adjustment of the Contract price.

## 1.4 PLANTING SEASON

- A. It is suggested that once finish and final grade is established, large trees be installed (winter months)
- B. Landscape planting shall be performed within the following dates:

October 15 to April 15



- C. If special conditions exist which may warrant a variance in the above planting dates, a written request shall be submitted to the A&E stating the special conditions and the proposed variance. Permission for the variance will be given, if warranted in the opinion of the A&E.

1.5 SHIPMENT AND DELIVERY

- A. Promptly notify the A&E, in advance, when the plant material is to be delivered and the manner of shipment.
- B. Furnish therewith an itemized list of the actual quantity and sizes.
- C. Deliver the necessary inspection certificates to accompany each plant or shipment prior to acceptance and planting.
- D. When shipment is made by truck, pack all plant material to provide adequate protection against climate and breakage during transit, and tie to prevent whipping.
- E. Cover the tops with tarpaulin to minimize wind whipping and drying, or spray adequately with anti-transparent.
- F. When shipment is made by rail, pack boxcars carefully, and adequately ventilate in accordance with plant requirements to prevent sweating of plants during transit.
- G. Exercise care at all times during handling operations to prevent damage to bark, branches, and root system.
- H. Employ a suitable method of handling to ensure the careful, workmanlike delivery of heavy balled plants to preclude cracked plant balls. No balled plant shall be planted if the ball is cracked or broken either before or during the planting operation. All balls over 36” diameter are to be platformed.

1.6 PLANT LOCATION

- A. Plan locations for plants and outlines for areas to be planted shall be located and marked on the ground by the Contractor for approval by the A&E, prior to digging plant holes or beds.
- B. Where so directed by the A&E, the Contractor shall install identification stakes to designate individual plants in major planting areas. Such stakes will be color coded in sizes as follows and shall be installed by the Contractor to supplement plant location markers. Wire flags will be acceptable when not interfering with utility staking.

<u>Plant</u>	<u>Color Scheme</u>	<u>Size</u>
Deciduous Trees	White-topped wooden stakes	3/4”x 3/4”x 48”
Evergreen Trees	Red-topped wooden stakes	3/4”x 3/4”x 48”
Flowering Trees	Yellow-topped wooden stakes	3/4”x 3/4”x 48”
Shrubs	Natural finish wooden	3/4”x 1-3/4”x 18”

- C. Stakes will not be furnished for all plants required by the Contract, but shall be used on portions of the project, until plant locations in these portions are approved by the A&E. Following the A&E approval, the stakes shall be moved to other portions of the project as directed by the A&E, and this sequence shall continue until all plant locations have been approved.
- D. Unforeseen conditions may make it necessary to make minor adjustments in plant locations, due to utility lines, rock, drainage, etc.; and such adjustments will be permitted, subject to approval of the A&E.

## 1.7 MATERIALS

- A. Back fill planting mix shall contain the following specified percentages of constituents: (see drawing G002-General Notes – Landscape Notes for details)
  - 1. 80% Native Soil (incorporate fertilizer/lime)
  - 2. 20% Approved Soil Conditioner
- B. A sample of the proposed backfill planting mix shall be brought to the A&E for approval prior to construction.
- C. Supply all plants as specified in plant list as located and shown on Drawings.
- D. Plants shall be typical of their species and variety; have normal growth habits; well-developed branches with no crotch angles sharper than 45°, densely foliated; and vigorous, fibrous root systems. No trees will be accepted unless they show healthy growth and satisfactory foliage conditions.
- E. Plants shall be free from defects and injuries. Plants shall be certified by the State and Federal authorities to be free from plant diseases and insect infestations.
- F. Size of plants, spread of roots, and size of balls shall be in accordance with ANSI Z60-J- latest edition, American Standard for Nursery Stock, as published by the American Association of Nurseryman, Inc. Quality shall appreciably exceed these standards.
- G. All plants of each particular variety shall be reasonably uniform in size and configuration. All plants shall be labeled with correct plant name and size. Labels shall be attached securely to all plants, bundles and containers of plant materials delivered. Plant labels shall be durable and legible, stating the correct plant name and size in weather-resistant ink or embossed process lettering.
- H. Plants shall not be pruned before planting. When plants are pruned, it will be in accordance with American Standard for Nursery Stock standards.
- I. Plants shall be freshly dug and nursery grown. Nursery-grown plants shall have been transplanted or root pruned at least once in the past three years. No plants showing evidence of Amade root balls will be accepted.
- J. No plants shall be delivered to the project site, except for required samples, until inspection has been made in the field or at the nursery, or unless specifically authorized

in writing by the A&E. Inspection of plants to be balled and burlapped must be made and plants must be approved before they are planted. Inspection shall be for quality, size and variety only, and shall not in any way impair the right of rejection for failure to meet other requirements during progress of the work.

- K. All new trees must have straight trunks with a single leader intact, unless multi-stem are specified. Bark shall be free of abrasions, and all cuts shall be completely callused over.
- L. Trees will not be accepted which have had their branches shortened, leaders cut or which have leaders damaged so that cutting is necessary.
- M. Dig ball and burlap (B&B) plants with firm, natural balls of earth, of diameter not less than that recommended in the "Tree and Shrub Transplanting Manual," and of sufficient depth to include the fibrous and feeding roots. Plants moved with a ball will not be accepted if the ball is dry, cracked or broken before or during planting operations.
- N. Unless otherwise specified, major deciduous trees shall be free of branches up to four feet from top of ball or to half their height, up to eight feet whichever is greater, well-branched, and with reasonably straight stems.
- O. Plants shall conform to measurements specified in the plant lists, except that plants larger than specified may be used if approved by the A&E. Use of such plants shall not increase the contract price. If larger plants are approved, the root ball shall be increased in proportion to the size of the plant.
- P. Mulch to be shredded and/or hammered pine and/or hardwood materials with sample provided for approval. All mulch should all be free of lumps, roots, sticks and other extraneous matter not befitting its use in planting beds or tree pits.

#### 1.8 FINAL GRADE

- A. Replace topsoil in all lawn areas to four inches minimum and meet finished grades. All areas disturbed by the Contractor's operations shall be properly returned to their original condition.
- B. Compact and shape to finish grades by leveling and raking to remove all lumps, stones, or other objectionable material, to present an even, uniform surface for seeding or planting.
- C. All areas shall be left smooth and free from erosion, ridges, ditches, and evidence of ponding. Final grades shall be free from all roots, debris, rock and soil lumps. Prior to acceptance of the entire project, the Contractor shall correct all embankments, and graded areas of all damages due to washes, settlement, erosion, equipment, ruts or any other causes at his expense.

#### 1.9 EXCAVATION

- A. No excavation or planting shall be done in soil that, in the opinion of the A&E, is too wet, too dry or not properly conditioned, as provided in these Specifications.

1. Notify the A&E in writing of all soil conditions which the Contractor considers detrimental to growth of plant material. State condition and submit proposal in writing to the A&E for correcting condition. Proper water drainage must be assured.
  2. If rock, underground construction work, tree roots, or obstructions are encountered in the excavation of plant pits, alternate locations may be selected by the A&E. Where locations cannot be changed as determined by the A&E, remove the obstructions to a depth of not less than six inches below the required pit depth. Proceed with work after approval of the A&E.
- B. Each tree pit outside of planting bed shall be two feet wider than the spread of roots or ball of earth. Dig tree pits deep enough to allow for six inches of compacted topsoil in the bottom. Prepare all planting pits with straight sides. Shape the pit bottom with the center slightly raised for proper drainage.

#### 1.10 PLANTING BEDS

- A. The extent of the planting bed shall be indicated on the Drawings. The planting bed for shrubs, groundcover plants and trees shall be prepared wide enough to accommodate all roots without crowding and twisting. The entire planting bed shall contain the planting mix herein before specified to a depth 18 inches, being tilled prior to planting.

#### 1.11 BACKFILLING

- A. When partially backfilled and compacted, cut the ball ties and remove the burlap from the top and side of the ball, and cut or adjust to prevent the formation of air pockets. No burlap shall be pulled from under the balls.
- B. Backfill ½ of remaining hole with planting mixture herein before specified, and water thoroughly. Backfill rest of hole with planting mixture. Firm down, eliminating all air pockets. Do not pack. Build a four-inch high berm around the edge of the root ball to form a basin for holding water. The bottom of the basin shall be at surrounding finish grade.

#### 1.12 WATERING

- A. Thoroughly water all plants immediately after planting. This shall mean full and thorough saturation of all backfill in the pits and beds during the same day of planting. Apply water only by open-end hose at a very low pressure to avoid air pockets and injury to the roots. When planted, watered, and fully settled, the plants shall be vertical and the top of the root ball shall not be below the existing grade.
- B. Fill basin with water, being careful not to break down berm with hose stream or to gouge out holes in the backfill.

### 1.13 PRUNING

- A. All pruning will be done in accordance with accepted National Arborist Association Standards. Prune only after initial inspection and approval by A&E. Prune in a manner to preserve natural character of plant and in manner appropriate to its particular requirement in the landscape design. In general, prune all dead, broken, weak, damaged, rubbing, or crossing branches back to main supporting branch or trunk at time of planting. Do not shorten branches or cut any leaders.
- B. Pruning of evergreen plants shall be limited to that required for correcting irregularities. Remove soft wood or sucker growth and broken or badly bruised branches. Prune with sharp tools; make cuts flush and clean.

### 1.14 GUYING

- A. Use Neptco Arbortape, Model No. AT901P, white tree guy material. Phone: 401.722.5500. Install per manufacturers recommendations, or approved equal.

### 1.15 MULCHING APPLICATION

- A. Within two days after planting, mulch all planting areas (individual tree pits, entire shrub and ground cover beds) with a four-inch layer of mulching material.
- B. Prior to mulching, apply Dacthal 75WL pre-emergence herbicide to surface at the rate of 10 lbs/acre or 116/5000 square feet. A second application at 10 lbs/acre or 116/5000 square feet shall be made after mulching.

### 1.16 ABANDONED PLANT PITS

- A. When utility lines or other unsuitable subsurface conditions are encountered in plant pits, A&E will direct that plants be relocated in satisfactory locations.
- B. Contractor is to backfill abandoned pit with suitable topsoil to compacted finish grade. Unsuitable material to be removed from property by Contractor.

### 1.17 MAINTENANCE

- A. The Contractor is immediately responsible for all maintenance of all plants and facilities until the deemed substantially complete. This includes all necessary watering, one spring and one fall application of appropriate fertilizer and any necessary pruning and weed control. Watering of woody plant material will be the responsibility of the Contractor until deemed substantially complete.

### 1.18 GUARANTEE AND REPLACEMENT

- A. All plants (trees, shrubs, ground cover) shall be fully guaranteed for a period of one year from date of interim acceptance. If any plants become damaged or injured, they shall be

treated or replaced as directed by the A&E at no additional cost to the Owner. Replacements will be made by the Contractor.

- B. All dead or unhealthy plants are to be promptly removed from the project by the Contractor; and, if this occurs during planting season (November to April), these plants shall be the same kind and size as specified in the plant list. Plants having sizable die back beyond the normal pruning limit, as determined by the A&E, shall also be replaced. When plant replacements are made, plants, plant soil mix, fertilizer and mulch, etc., shall be replaced as originally specified.

#### 1.19 CLEAN-UP

- A. During the installation, the Contractor will be required to keep all areas clean.
- B. At the time of interim inspection of work, and before issuance of Certificates of Interim Acceptance, the Contractor shall clean paved areas thoroughly by sweeping and/or washing. Any defacements or stains caused by the work of this Section shall be removed by the Contractor.
- C. The Contractor shall remove construction equipment, excess materials, tools, and all debris and rubbish from the site.
- D. All dirt and debris shall be disposed of by the Contractor in areas approved by the A&E.

#### 1.20 INSPECTION (INTERIM ACCEPTANCE)

- A. Upon completion of all planting operations, including clean-up, the Contractor shall notify the A&E and accompany him/her on inspection of planting. All items found to be unsatisfactory will be have to be corrected or approved for correction prior to approval for interim acceptance.

#### 1.21 FINAL INSPECTION (ACCEPTANCE)

- A. At the end of the one year guarantee period, and upon written notice submitted by the Contractor at least 10 days before the anticipated date, an inspection will be made by the A&E and the Contractor.
- B. As required under this Contract, any plant that is dead or not in satisfactory growth, as determined by the A&E, shall be removed from the site. These and any plants missing shall be replaced as soon as conditions permit, but during the normal planting season.

#### 1.22 SAFETY

- A. The Contractor shall be responsible for the safety of all vehicles and persons and shall place barricades, signs and warnings in the proper areas. The Owner shall not be held responsible for any damage or injuries incurred under this Contract.

1.23 TIME EXTENSIONS

- A. In the event of delay of work due to unfavorable planting conditions, the Contractor may apply for an extension of time by submitting in writing to the A&E the reasons necessary for the extension; he/she shall not proceed with work past the contract completion date until he has approval in writing from the A&E.

END OF SECTION

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## SECTION 330528 - TRENCHING FOR SITE UTILITIES

## PART 1 - GENERAL

## 1.1 SECTION INCLUDES

- A. Excavate trenches for private and municipal utilities.
- B. Compacted bedding around utilities.
- C. Backfilling and compaction to subgrade elevations of trench fill material.

## 1.2 RELATED SECTIONS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.
- B. Section 31 20 00 – Earthwork
- C. Section 33 41 00 – Storm Drainage

## 1.3 REFERENCES

- A. NCDOT — Standards Specifications for Highway Construction, current edition
- B. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.
- C. ANSI/ASTM D1557 or D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures.
- D. ASTM D2922 - Field Density Testing by Nuclear Method.
- E. ASTM D2321 - Standard Practice for Installation of Thermoplastic Sewers and Other Gravity Flow Applications.

## 1.4 SUBMITTALS

- A. See Section 013300 Submittal Procedures for submittal procedures.
- B. Pre-Install: Product Data: Submit copies of manufacturer's detailed materials and fabrication specifications and installation instructions. Include catalog cuts of hardware, anchors, fastenings, and other data as required. Indicate by transmittal form that copy of each instruction has been distributed to the installer.
- C. Post Install: Compaction density Test Reports

## 1.5 PROJECT CONDITIONS

- A. Provide sufficient quantities off fill to meet the project schedule and requirements. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where designated.
  - 1. Separate differing materials with dividers or stockpile separately to prevent mixing.
  - 2. Prevent contamination
  - 3. Prevent stock piles from erosion or deterioration.
- C. Verify that survey benchmark and intended elevations for the work are as shown on drawings.
- D. Protect benchmarks, survey control points, existing structures, sidewalks, paving, and curbs from excavation equipment or vehicle traffic.

## PART 2- PRODUCTS

### 2.1 FILL MATERIALS

- A. Subsoil, reused.
- B. Granular fill to be approved per NCDOT Std. Specs
- C. Per manufacturer specifications

### 2.2 PIPE BEDDING MATERIALS

Refer to std. drawings and NC DOT Std. Specifications Section 3- Pipe Culverts, Section 8 Incidental-Subsurface Drainage and Section 10 Materials

- A. Subsoil, reused.
- B. Granular fill
- C. Course aggregate drain stone.
- D. Pea gravel.
- E. 500 psi compressive strength concrete.
- F. For flexible pipe material refer to manufacturers' recommendations.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify acceptability of fill materials proposed to be reused based on pipe bedding and backfill details.
- B. Existing Utilities: Contractor shall contact the state underground utility location agency a minimum of 3 working days prior to the start of construction for location of existing utilities in the construction zone.

### 3.2 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Excavating and trenching operations shall at all times be conducted in a safe, orderly manner using methods and equipment designed and suited to the intended use by personnel experienced in the work being performed.
- C. None of the requirements or provisions specified herein or shown on the plans shall nullify or restrict any safety provisions required by any regulations or law governing the protection and/or safety of persons or property.
- D. The use of mechanical equipment will be permitted except in locations where its operation would cause damage to trees, buildings, culverts, or other existing property utilities, or structures above or below ground; in all such locations, hand excavating tools and methods shall be used.
- E. Mechanical equipment used for trench excavation shall be of a type, design, and construction, and shall be so operated that uniform trench widths and vertical side walls are obtained at least from an elevation 1 foot above the top of the pipe for pipes with diameters of 6 inches

and larger (minimum 6 inches above top of pipe with less than 6 inches diameter) above top of the installed pipe to the bottom of the trench and that the trench alignment is such that the pipe when accurately laid to specific alignment will be centered in the trench with adequate clearance between the pipe and the side walls of the trench. Undercutting of the trench side wall to obtain clearance will not be permitted. Where necessary to reduce the earth load on trench banks to prevent sliding and caving, the banks may be cut back on slopes that shall not extend lower than 1 foot above the top of the pipe.

### 3.3 EXCAVATION

- A. Excavate subsoil required for all utility piping.
- B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection. The width of the trench shall be ample to permit the pipe to be laid and joined properly, and the pipe embedment material and backfill to be placed and compacted as specified. Trenches shall be of sufficient extra width, when required, as will permit the convenient placing of trench supports, sheeting, and bracing.
- C. Excavations shall provide adequate clearance for installation and removal of concrete forms. Monolithic concrete manholes and other concrete structures, or parts thereof, which do not have footings that extend beyond the outside face of exterior walls may be poured directly against excavation faces without the use of outer forms, provided that such faces are stable, and also provided that a layer of polyethylene film is placed between the earth and concrete.
- D. Excavations for manholes and similar structures that are constructed of masonry units shall be of such horizontal dimensions that not less than 6 inches clearance is provided for working area.
- E. In order to limit excessive loads on the pipe, the maximum width of trench for pipe 36 inches and larger in diameter shall be not more than twice the inside diameter; for smaller sizes of pipe, the maximum width of trench shall be not more than 3 feet greater than the inside diameter of the pipe, except as otherwise specified or directed. These limiting restrictions on trench width apply from outside bottom of pipe to 2 inches above the outside top of pipe. Where the width of trench within these limits exceeds the maximum limit specified, the Contractor shall install a heavier class of pipe or use other means to provide additional load carrying capacity at no additional cost to the Owner. Any changes in class of pipe or other variation shall be approved in writing by the Owner's Representative before the work progresses.
- F. When the trench width above the top of the pipe is appreciably greater than that which is reasonably required by project conditions in the judgment of the Owner's Representative, any additional cost for backfill material, surface restoration, or other items that are the result of such excess trench width, shall be the Contractor's responsibility.
- G. The subgrade for the pipe and/or structures shall be firm, dense and thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workers. Trench bottoms or subgrade for concrete structures that are otherwise solid, but that become soft or spongy on top due to construction operations, shall be reinforced with crushed stone or gravel. The finished elevation of stabilized subgrade shall not be above the subgrade elevations specified. When the excavation at the pipe foundation grade is in undesirable soil, the Contractor shall excavate an additional 6 inches in depth and refill with approved materials thoroughly compacted to the established pipe foundation grade. This work shall be incidental to the price bid for the laying of the pipe. The cost for excavating the additional depth and furnishing and placing up

- to 6 inches of approved stone or gravel, shall be included in the cost for installing the pipe or structure, and no additional payment will be made.
- H. Excavation shall not interfere with normal loading influence plane of the foundations.
  - I. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
  - J. Remove lumped subsoil, boulders, and rock.
  - K. Correct unauthorized excavation at no cost to Owner.
  - L. Correct areas over excavated by error in accordance with Paragraph 3.03, G of this section.
  - M. All excavated material shall be piled in such a manner that will not endanger the work.
  - N. The trench shall be excavated beginning at the outlet end and proceeding toward the upper end, unless otherwise directed by the Owner's Representative. The trench shall not be excavated ahead of the pipe laying operation more than the Contractor can reasonably expect to backfill by the end of the working day. At no time shall the open trench be more than 300 feet ahead of the pipe laying operation. If adverse weather conditions prevent backfilling of the trench at the end of the working day, temporary barricades will be installed as specified in the General Requirements.
  - O. Except where tunneling is shown on the plans, is specified, or is permitted by the Owner's Representative, all trench excavation shall be open cut from the surface.
  - P. Building connections, water mains, gas mains, conduits, drains, etc., when encountered in the trench, shall be properly supported and protected across the excavation, unless otherwise shown on the plans or directed by the Owner's Representative.

#### 3.4 SHEETING, SHORING, AND BRACING

- A. The Contractor shall furnish, install, and maintain such sheeting, shoring, and bracing as may be required to support the sides of the excavation and to prevent any movement of earth which would damage or delay the work or cause damage to adjacent pavement, buildings, or other structures, and as may be required in standards set forth by the Federal Occupational Safety and Health Act of 1970 under Public Law 91-596. Any sheeting shall be braced such that no concentrated loads or horizontal thrusts are transmitted to the pipe or other structure within the trench.
- B. Care shall be taken to prevent voids outside the sheeting, but if voids are formed, they shall immediately be filled and compacted. Whenever a movable steel trench box is used in place of sheeting, the Contractor shall take care to prevent the pipe from moving when the steel trench box is moved. The pipe shall be secured to prevent longitudinal movement.
- C. Trench sheeting shall not be removed unless the pipe or structure strength is sufficient to support the external loads, including the weight of a prism of earth above the top of pipe within trench width as measured between the back of the sheeting. All sheeting and bracing that is not left in place in the trench shall be removed without damage to the new installation or adjacent structures and facilities, utility conduits, or property whether public or private. All voids left or caused by withdrawal of the sheeting shall be immediately refilled with sand or gravel, and compacted with tools adapted for that purpose.

#### 3.5 PIPE BEDDING

- A. Support pipe during placement and compaction of bedding fill.

- B. Pipe embedment shall include the furnishing and placing of approved materials, as specified or as directed, from 4 inches under the outside bottom of the pipe to 12 inches over the outside top of the pipe. Various classes of pipe embedment may be specified or shown on the plans, in which case the limits of the various types will also be specified. When the soil in the bottom of the trench at pipe subgrade will provide suitable bedding for the pipe, as determined by the Testing Consultant, such soil may be utilized as bedding material and prepared to receive the pipe as specified without undercutting and subsequent replacement.
- C. Special Pipe Embedment: Various types of special pipe embedment may be specified or shown on the plans in locations where special conditions require their use or where the pipe material requires flexible wall consideration. The Contractor shall perform all the work of constructing special pipe embedment where specified or where directed.
- D. Placing Pipe Embedment Material: Pipe embedment material shall be placed in the bottom of the trench and shaped by hand to provide a firm and uniform bearing for the barrel of the pipe with additional shaping to accommodate the bells on bell and spigot pipe.
- E. After each pipe has been graded, aligned, and placed in final position on the bedding material and jointing is complete, additional embedment material shall be carefully placed and compacted under and around each side of the pipe and over the pipe until it is completely covered by 12 inches of embedment material. Said material shall be distributed along both sides of the pipe uniformly and simultaneously to prevent lateral displacement of the pipe. All granular embedment material shall be compacted to 95 percent of maximum density at optimum moisture content as determined by modified proctor or standard proctor analysis in accordance with the assigned site compaction requirements.
- F. All the work of placing pipe embedment shall be considered an integral part of installing the pipe and shall be completed immediately after the pipe is laid to the correct alignment and grade.

### 3.6 BACKFILLING

- A. Backfill trenches 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 and compact material in continuous layers not exceeding compacted depth of 8 inches for soil fill and 6 inches for granular fill. Compact material to 95 percent of maximum density in accordance with ANSI/ASTM D1557 or 100 percent maximum density in accordance with ANSI/ASTM D698.
- D. Employ a placement method that does not disturb or damage pipe in trench.
- E. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. Correct areas that are over excavated, slope grade away from buildings (2inches in 10 feet unless shown otherwise)'
- G. Reshape and re-compact fills subject tot vehicular traffic

### 3.7 TOLERANCES

- A. Surface Grade of Backfilling: Plus or minus 1/10 foot with the intent of achieving the overall planned surface grade elevation.

3.8 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of General Conditions and section 014000-Quality Requirements.
- B. Tests and analysis of compacted fill material will be performed in accordance with ANSI/ASTM D1557, D1556 or D2167, D2922, D3017 or D698 and per the Project contract documents.
- C. Evaluate results in relation to compaction curve determined by testing un-compacted material in accordance with ASTM D 698 ("standard Proctor")
- D. If tests indicate work does not meet specified requirements, remove work and replace for retest at no cost to Owner.

END OF SECTION

**SECTION 331000****WATER LINES, VALVES AND ACCESSORIES**

***Please refer to the City of Concord details and specifications and WSACC specifications. Where WSACC and the City's standard specifications and details are similar, the City's shall apply. If conflicts arise between WSACC and specifications, WSACC shall take precedence.***

<https://www.wsacc.org/wsacc-standard-specifications/>

<https://apps.concordnc.gov/legacy/planningweb/CDO/TSM/Complete%20TSM.pdf>

**PART 1 - GENERAL****1.01 WORK**

- A. The work covered by this Specification consists of the furnishing and installation of different sizes, types and classes of pressure piping, fittings, valves, and other accessories. All labor, tools, materials, supervision and equipment necessary in the performance of the work shall be furnished by the Contractor. The 6" waterline, connections, appurtenances, etc. and other work specified in specifications.
- B. Work in this Specification includes, but is not limited to the following:
  - 1. Pipe Installation
  - 2. Valve Installation
  - 3. Connections to Water Mains
  - 4. Service Taps
  - 5. Pressure and Leakage Tests
  - 6. Disinfection

**1.02 RELATED SECTIONS**

- A. Section 31 20 00 – Grading-Earthwork
- B. Section 03 30 00 – Concrete Work

**1.03 REFERENCES**

- A. ASTM D 3034 - Section 02310 Standard Standards Specifications for Type PSM Poly (Vinyl Chloride)(PVC) Sewer Pipe and Fittings
- B. Requirements of the North Carolina Department of Environmental Quality,



#### 1.04 SUBMITTALS

- A. See Section 013100 – Administrative Requirements, for submittal procedures
- B. Product Data: Provide date indicating pipe and pipe accessories.
- C. Project Record Documents:
  - 1. Record location of pipe runs, connections, manholes, cleanouts and invert elevations.

### PART 2 - PRODUCTS

#### 2.01 PRESSURE PIPE

- A. Pipe shall comply with the following requirements for the type of pipe indicated in the Bid Schedule or shown on the Drawings. All pipe shall be tested in accordance with the Specifications indicated herein. Copies of the test results normally will not be required by the Engineer but shall be available if requested. All pipe shall be marked as indicated in the referred Specifications:
  - 1. Ductile Iron Pipe
    - a. Ductile iron pipe shall conform to ANSI/AWWA C151/A21.51 for Type 2, laying conditions, suitable for 12 feet of cover over the pipe. Pipe shall be Class 350 for buried service. Pipe joints shall be rubber-gasket, push-on joints as described in ANSI A21.11. Mechanical joints conforming to ANSI/AWWA C111/A21.11 shall be used where shown on the Drawings. All exposed interior ductile iron pipe shall be Class 52, threaded and flanged conforming to ANSI A21.15. All interior surfaces of ductile iron pipe shall be cement-mortar lined in accordance with ANSI/AWWA C104/A21.4.
    - b. Fittings shall be mechanical joint, ductile-iron, Class 350 equal to or exceeding Class 350 pipe thickness conforming to AWWA C110 or C153. Flanged joints, Class 125, with full face rubber gaskets shall conform to ANSI/AWWA C110. All interior surfaces of fittings shall be cement-mortar lined conforming to ANSI/AWWA C104/A21.4. Fitting accessories shall conform to the Fitting and Pipe Specification above.
    - c. All exterior surfaces of pipe and fittings for underground service shall be given a bituminous coating of approximately 1-mil. thick. All

pipe and fittings specified for exposed, interior installation and to be painted shall not be bituminous coated.

2. Plastic Pipe (If approved by utility)
  - a. Polyvinyl Chloride Pipe (PVC)
    - 1). PVC pipe shall conform to ASTM D2241 with a wall thickness standard dimension ratio of SDR21 for 200 PSI work pressure. Clean virgin resin conforming to ASTM D1784 shall be used for the manufacture of PVC pipe. Laying length shall not exceed 20 feet. All pipe shall bear the seal of the National Sanitation Foundation (NSF). The push-on joint pipe shall be furnished with integral thickened wall bells made monolithically with the pipe. Rubber rings shall conform to ASTM D1869, with provisions for expansion and contraction at each joint.
    - 2). Fittings shall be ductile iron, Class 350, for mechanical joints or push-on joints conforming to ANSI/AWWA C110. Ductile iron shall conform to ASTM A536. Gaskets shall conform to ASTM F477. Fittings shall have radii of curvatures conforming to ANSI/AWWA C110 and shall be cement-mortar lined conforming to ANSI A21.4.
  - b. PVC Pipe
    - 1). PVC pipe (DR18) shall conform to AWWA C900 with a wall thickness dimension ratio of DR18 for 150 PSI working pressure. Pipe shall be made from Class 12454-A or Class 12454-B virgin compounds defined in ASTM D1784. Laying lengths shall not exceed 20 feet and each length shall bear the seal of the National Sanitation Foundation (NSF).
    - 2). The push-on joint pipe shall be furnished with integral wall thickened bell end made monolithically with the pipe. Elastomeric gaskets and lubricants shall conform to ASTM D1869, with provisions for expansion and contraction at each joint.
    - 3). Fittings shall be ductile iron, Class 350, Grade 80-55-06 for mechanical joints or push-on joints conforming to ANSI/AWWA C110. Ductile iron shall conform to ASTM A536. Gaskets shall conform to ASTM F-477. Fittings shall have radii of curvatures conforming to ANSI/AWWA C110 and shall be cement-mortar lined conforming to ANSI A21.4.

## 2.02 MUNICIPAL WATER SERVICE TUBING

- A. Pipe and tubing for water service from the water main to the water meter shall be installed as indicated in the Specifications or shown on the Drawings.
1. Copper Tubing
    - a. Copper tubing shall conform to the requirements of ASTM B88, Type K, soft temper for burial underground or in concrete walls and slabs and around equipment when bending is required. Hard temper tubing, Type L, shall be used in exposed lines, especially if tubing is to be hung from ceilings or braced to walls.
    - b. Copper fittings shall be of the same type and manufacture as the copper pipe. Sweated joints shall be made with Type 95-5 solder suitable for type of pipe.
  2. Polyethylene Plastic Pipe (PE)
    - a. Polyethylene plastic pipe sizes ½ inch through 3 inches, for municipal service shall be manufactured of Type III, Grade 3, Class C material as specified in ASTM Designation D1248 and pipe shall have a working pressure of 160 PSI at 73.4 degrees F at hydrostatic design basis of 1250 psi. Pipe shall conform to AWWA C901 with a dimension ratio of DR7. All pipe shall be permanently imprinted with the NSF logo.
    - b. All connections shall be made with bronze insert fittings and clamps, bronze compression fittings or locked-in flared connections as recommended by the pipe manufacturer.

## 2.03 VALVES

- A. Gate Valves
1. All gate valves shall comply with these Specifications and shall be furnished by the same manufacturer.
    - a. Gate valves three inches and smaller shall be all bronze construction with the solid wedge, non-rising stems and for 200-pound working pressure. Threaded valves shall be ITT Grinnell, Fig. 3000 or equal. Flange valves shall be ITT Grinnell, Fig. 6060 or equal. Exposed valves shall be furnished with a hand wheel. Buried valves shall be furnished with a solid tee operator, and a cast iron, two-piece, slip-type valve box.

- b. Gate valves between 3 and 12 inches shall be iron body, resilient-seated, fully bronze mounted, for a working pressure of 200 PSI and with non-rising stem and shall conform to AWWA C509. Resilient-seated gate valves shall be hub-end or mechanical joint to fit the pipe for which they are to be used. Resilient-seated gate valves shall be fitted with two "O" ring seals constructed of rubber composition with the upper seal being capable of replacement with the valve under pressure in the full-open position. All resilient-seated gate valves shall have a clear waterway of the full diameter of the valve.
- c. Each valve shall have the maker's initials, pressure rating, and year in which it was made cast on the body. The two-inch square wrench nut shall have cast thereon an arrow indicating the direction of the opening. All valves shall open left or counterclockwise. Valves shall be manufactured by the Mueller Co., American Valve and Hydrant Co. American-80, or Kennedy Valve Co. Ken-Seal.
- d. Valves for interior or exposed uses shall be provided with ANSI B16.1, Class 125, flanged fittings, outside screw and yoke (OS&Y), hand wheels, floor stands, extension stems, brackets and operating chains as specified or shown on Drawings.
- e. Prior to shipment from the factor, each valve shall be tested by hydraulic pressure equal to at least twice the water working pressure of the valve. Valves showing any defects or leakage under test shall be rejected. Copies of the test results shall be available if requested by the Engineer.
- f. Gate valves 16 INCHES AND LARGER shall be furnished with non-rising stems with conventional packing and shall conform to AWWA C500. Horizontal valves shall have bevel-gearing encased in a grease case with an extended yoke making it possible to adjust or replace the stem packing without disturbing the gears. Horizontal valves shall be furnished with rollers, bronze tracks, scrapers, and by-pass valves. Vertical valves shall be designed for a minimum working pressure of 150 PSI. Exposed valves shall be furnished with outside stem and yoke (OS&Y).
- g. All large gate valves shall be furnished with a by-pass resilient-seal gate valve (AWWA C509) and sized in accordance with AWWA C500.
- h. Tapping valves shall be furnished with tapping crosses or tapping sleeves with mechanical joints to provide pressure-tight installation with virtually no loss of water. Sleeves and valves shall be furnished by the same manufacturer as the gate valves. The length

of the sleeve shall have a minimum length equal to one and one-half times the diameter of the pipe.

2. Check Valves

- a. Check valves shall be furnished by the gate valve manufacturer. Buried check valves larger than 3 inches shall be iron body, fully bronze mounted with bronze disc ring and seating ring, single disc swing type, gravity operated and designed for at least 125 PSI working pressure.
- b. Small check valves, 3 inches and smaller shall be all bronze construction with regrinding bronze disc. Threaded check valves shall be ITT Grinnell, Fig. 3300, or others approved as equal by the Engineer.

3. Butterfly Valves

- a. Butterfly valves shall conform to AWWA C504. Valves shall be suitable for direct bury with a 2-inch AWWA nut, extension shaft and ground level position indicator. Valves shall open left or counterclockwise.

4. Combination Air Release Valves

- a. Valves to automatically release entrapped air from pipelines being filled, to permit air to enter pipeline when line is emptied, and to allow accumulating air to escape while line is in operation shall be installed at high points of the supply line as shown on the Drawings. Valves shall have cast iron body with brass or stainless steel interior parts. Working pressure shall be 150 PSI.
- b. Valves shall be manufactured by APCO Valve and Primer Corporation. Series 140 and 200, Crispin Combination air Valve, C-10, or others approved as equal by the Engineer.

5. Cast Iron Valve Boxes

- a. All buried gate valves shall be provided with adjustable 5¼ -inch shaft, slip type, two-piece cast iron valve boxes. The cast iron lids shall have cast thereon the word "Water" or "Sewer."

**2.04 FIRE HYDRANTS**

- A. Hydrants furnished shall conform to the requirements of the AWWA Specifications C502. All hydrants shall have an inlet connection of not less than six inches in diameter and shall have ANSI A21.11 mechanical joint

ends. Each hydrant shall be equipped with two 2½-inch hose nozzles and one 4½-inch pumper nozzle. Main hydrant valve shall be not less than 4½ inches in diameter and shall be of the type that closes with the pressure. Hydrants shall be suitable for the depth of the trench listed under pipe laying. All water passages shall be of such form and size as to permit the full flow of water without undue friction loss. Hydrants shall have an all bronze drain ring with bronze to bronze seating. The valve stem and valve shall be removable without the necessity of digging up the hydrant. The hydrants shall have a safety break mechanism which contains a breakable flange and stem coupling located near the ground. The safety flange shall be capable of withstanding normal operating pressures.

- B. In all cases where applicable, the hydrant shall match the existing hydrant in the Owners system as to size and number of outlets, direction of openings and hose threads. Fire hydrants shall be furnished by Waterous Hydrants, opening left or counterclockwise and shall be painted red.

## 2.05 WATER METERS

- A. Cold water meters shall conform to AWWA Standard C700 and shall be positive displacement type with magnetic drive, bronze main case, rotating disk and cast iron freeze protection bottom cap. The polymer registers shall be hermetically sealed, guaranteed for a period of 10 years, and shall be straight reading with center sweep test pointer with index circle graduated in 100 equal parts, each tenth numbered. Measuring chambers shall operate in either a well water or treated water supply. All meters one inch and smaller shall be furnished with coupling nuts and tail pieces when copper setters or yokes are not specified. All meters installed under this Contract shall be of one manufacturer, and shall read in gallons. Serial numbers shall be imprinted on the register box lid.
- B. All meters shall be tested for accuracy and capacity by the manufacturer.
- C. Each and every meter furnished shall be guaranteed for a period of one year from date of final inspection against faulty material and workmanship, and in case of any dissatisfaction during that time directly traceable to either of these causes, the parts so affected shall be replaced without any transportation or repair cost to the Owner.
- D. Meters must have been available to the general market for a minimum of 5 years. Meters shall be furnished by Badger Meter with 100W Itron.

## 2.06 METER BOXES

### A. Concrete Meter Boxes

1. Concrete meter boxes shall have reinforced concrete covers with a hinged, self-closing, and cast iron reading lid. When meter box is located within an area subject to traffic flow, the lid shall be a one-piece heavily ribbed cast iron cover. Meter boxes shall be equal to Brooks Series 30 or others approved as equal by the Engineer.

### B. Cast Iron Meter Boxes

1. Cast Iron meter boxes shall be capable of accepting a 5/8-inch – 3/4-inch meter and cut off. Meter box shall be furnished with cast iron cover. Covers may be furnished with ready lids. Boxes shall be Rome Type D-1910 or equal.

## PART 3 - EXECUTION

### 3.01 HANDLING PIPE

- A. During loading at plant site, transportation, unloading and re-handling of pipe, every precaution shall be taken to prevent damage to the pipe, its lining and coating. Pipe shall be removed from truck in a careful manner to reduce banging of pipe against truck or unloading equipment. No pipe shall be dropped from the trucks.
- B. Each section of pipe shall be delivered in the field as near as practicable to the place where it is to be installed. Pipe may be distributed along the side of the trench opposite to the spoil bank or stock-piled. Where necessary to move the pipe longitudinally along the trench, it shall be done in such a manner as not to injure the pipe or coating. Where pipe is placed in stock piles, it shall be neatly piled and blocked with strips between tiers.
- C. Any pipe that is damaged in any manner shall be set aside and marked with paint. The damaged portion may be cut off and the remainder used if possible. If damaged pipe is not painted, it shall be removed from the job site immediately.

### 3.02 INSTALLATION OF PIPE

- A. All pressure pipe shall be installed in trenches in accordance with Division 2, Section 02113 of these Specifications. Each pipe shall be laid on a firm bed true to line and grade, and in such manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line or disturbance of the line and grade.
- B. Deflections from a straight line or grade shall not exceed the maximum joint deflection recommended by Table 4 or Table 5 of the AWWA C600 or the pipe manufacturer, whichever is smaller. If the specified alignment requires deflections in excess of those recommended, the Contractor shall provide either bends or pipes in shorter lengths, in such length and number, that the angular deflections of the pipe joints shall not be exceeded.
- C. Cutting of pipe for closure or for other reasons shall be done in neat and workmanlike manner by a method which will not damage the pipe. All such cutting of pipe shall be done by mechanical cutters or saws. The interior of the pipe shall be thoroughly swabbed and cleaned to remove all foreign matter before pipe is installed.
- D. All fitting accessories such as nuts, bolts, gaskets, and flanges shall be installed in a workmanlike manner and in accordance to the respective AWWA or ASTM Specifications. In all cases, pipe shall be joined by using the proper primers, lubricants, and adhesives to procure a uniform invert and watertight joint.
- E. At the end of each day's work or at any time the pipe laying operations are stopped or delayed, the Contractor shall provide a watertight seal at all exposed ends of pipe or fittings.

### 3.03 CONNECTIONS WITH EXISTING PIPELINES

- A. Where connections are to be made between new work and existing piping, such connections shall be made in a thorough and workmanlike manner, using suitable and proper fittings to suit the conditions encountered. All connection points shall be verified in field for type, size, and joint(s) before actual connection shall be made.
- B. Each connection with an existing water pipe shall be made at a time and under conditions which will least interfere with water service to customers



affected thereby and as authorized by the Owner. Suitable facilities shall be provided for proper dewatering, drainage, and disposal of water removed from the dewatered lines and excavations, without the damage to adjacent property.

### **3.04 BRACING SUPPORTING AND ANCHORING PIPE AT BENDS**

- A. All water line installed under this Contract shall be adequately secured against movement by the use of metal pipe supports, hangers, ties, brackets, inserts, clamps, concrete piers and concrete blocking. The Contractor shall provide all items necessary to secure piping as required or directed to provide a complete and working installation at the Contractor's expense.
- B. All buried water lines, fittings at bends, branches, gate valves and hydrants in the pipe line shall be firmly wedged between the fittings and the undisturbed vertical face of the trench, with Class 2500 concrete or restrained with steel rods in order to prevent the fittings from being blown off the line when under pressure. Blocking shall be in accordance with AWWA Specification C-600.
- C. All fittings placed at bends or breaks in grade in vertical plans shall be provided with adequate concrete embedment and straps at the base of slopes and shall be adequately anchored, to the satisfaction of the Engineer, to resist the maximum test pressure at the top of slopes.

### **3.05 VALVE INSTALLATION**

- A. Gate valves shall be installed in the water line as shown on the Drawings. Valves shall be braced or tied with steel rods. Each buried gate valve shall be furnished with a cast iron valve box. Valve boxes shall be installed vertically and plumb. Buried valves shall be furnished with necessary extension stems of sufficient length so that operating nut will not be greater than 12 inches below grade. Stem and interior of valve box shall stand free of each other.
- B. Valve boxes not located in pavement shall be protected with a pre-cast concrete collar or a poured-in-place concrete pad.
- C. Butterfly valves shall be installed by direct bury and held in position by concrete blocking, steel rods, or "Mega-Lug" type joint restraints. Each valve shall be furnished with a cast iron valve box which shall be installed

vertically and plumb. The ground level position indicator shall be mounted and adjusted to provide a true indication of valve position from fully open to completely closed. Valve boxes not in pavement shall be protected with a pre-cast concrete collar or a poured-in-place concrete pad.

- D. Combination Air Release Valves shall be enclosed in a valve vault as shown on the Drawings.

### **3.06 FIRE HYDRANTS**

- A. Fire hydrants shall be set at the ground line and be plumb at final inspection. Hydrants which moved or shifted during pressure and leakage tests shall be re-aligned. Extension sections shall be furnished for hydrants from tees of larger pipe or located on slopes so that the safety flange and nozzles shall be above ground.
- B. Two spare safety flange repair kits, and two adjustable operating wrenches to fit all parts of the hydrant shall be furnished to Owner prior to final inspection. A 6-inch gate valve and cast iron valve box shall be required in the fire hydrant leader. The 6-inch leader pipe to the fire hydrant shall be paid as 6-inch line. Hydrants shall be installed beyond the ditch line of NCDOT roads.

### **3.07 WATER METERS**

- A. Water meters shall be installed in a meter box with adequate space for housing meter shut-off and meter connections. Boxes shall be installed out of traffic areas whenever possible. Lids shall have "water" cast thereon.

### **3.08 WATER SERVICE CONNECTIONS**

- A. Lots indicated by the Owner shall be served with a 3/4-inch municipal water service connection from the water main to the meter box at the right-of-way lines. The service connection shall be made with a corporation stop with AWWA C800 threads complete with coupling bends and adaptors to fit type of pipe being used. Where thickness of pipe is 0.30 inches or more and four full threads can be inserted into the pipe material, the corporation stop may be drilled into the pipe. For thinner wall pipe, and PVC pipe, combination corporation stop and saddle shall be used. Saddles for PVC pipe shall be Rockwell 313, or others approved as equal by the Engineer.

Each meter box shall be furnished with a copper meter setter, a lock wing inlet angle meter valve and outlet valve.

### 3.09 PRESSURE AND LEAKAGE TESTS

- A. Pipe lines shall be subjected to hydrostatic pressure and leakage tests made by the Contractor after backfilling the trench. All material, equipment, pumps, including gages, and labor required to conduct the tests shall be furnished by the Contractor. Tests shall be conducted in accordance to AWWA C600 as modified herein. It is the intent of this Specification that all joints in the water line shall be watertight and that all leaks which are found either by observation or any specified test shall be made watertight by the Contractor, regardless of the amount of leakage.
- B. All joints in exposed pipe, regardless of location, shall be tight and drip free at all operating pressures. Water for the tests shall be taken from the system when available. Cross-connections will not be allowed. Where any section of a water line is provided with concrete reaction backing for fittings or hydrants, the hydrostatic pressure test shall not be made until at least five days after the installation of the concrete reaction blocking. All air shall be expelled from pipe, valves and hydrants.
- C. Hydrostatic test pressures shall be 50 percent above normal working pressure, based on the elevation of the lowest point in the line or section being tested and corrected to the elevation of the test gage. Test pressure shall not vary more than 5 PSI plus or minus during the test.
- D. The leakage test shall be set at the maximum working pressure but not less 100 PSI corrected to the elevation of the test gage. The amount of water added to maintain pressure shall be measured.

#### 1. Pressure Tests

- a. The newly laid water line or any valved section of piping shall be continuously subjected for four hours to a hydrostatic pressure test as indicated above. Pressure tests shall not be conducted on pipe line sections over one mile in length. Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, valves, and hydrants shall be carefully examined during the test. Joints showing visible leakage shall be replaced or remade as necessary. Leaking rubber-gasketed joints shall be remade, using new gaskets if necessary. Cracked or defective pipe, mechanical joints, fittings, valves, or hydrants discovered in consequence of

this pressure test shall be removed and replaced with sound material, and the test shall be repeated until the test results are satisfactory.

## 2. Leakage Test<sup>1</sup>

- a. The leakage test may be conducted concurrently with the pressure test. However, the duration of each leakage and pressure test shall be at least a total of 8 hours and during the test, the main shall be subjected to the test pressures of at least 100 PSI. Leakage is defined as the quantity of water that must be supplied into the newly laid water line, or any valved section thereof, necessary to maintain the pressure within 5 PSI of the specified pressure for the duration of the test. No piping installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{SD}{148,000} \sqrt{P}$$

- b. In which L equals the allowable leakage in gallons per hour; S is the length of pipe line tested, in feet; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gage.
- c. Should any test of water line laid disclose leakage greater than that indicated in Table 6 of AWWA C600, the defective joints shall be located and repaired until the leakage is within the specified allowance, and all visible leaks have been eliminated without additional cost to the Owner.

### 3.10 DISINFECTION

#### A. General

1. All work in connection with disinfection of water lines shall be done in complete accordance with the following requirements of South Carolina Department of Health and Environmental Control (SCDHEC) and local utility preferences. The Contractor shall furnish all materials, equipment, tools and labor to do all work required for disinfection. It shall be the Contractor's responsibility to have samples collected and tested, at no extra cost to the Owner.

**B. Water Lines**

1. All water lines for the distribution of potable water shall be thoroughly flushed to remove all mud, dirt, and debris. A blow off, a corporation stop or a fire hydrant shall be installed at the end of the line to release entrapped air when the lines are filled with chlorinated water from the opposite end. The chlorine shall be injected into the new pipe system by means of a pump as water is slowly introduced into the pipe system from the existing water distribution system, the disinfected well or from other sources. The chlorinated water shall have a minimum available chlorine concentration of 50 PPM. After filling the new lines with chlorinated water, they shall be valved off and the chlorinated water allowed to remain in the lines for 24 hours. At the end of this period, the chlorine residual shall be at least 10 PPM. The lines should then be thoroughly flushed until there is only a normal chlorine residual present, as determined by the orthotolidine test. Several samples of water shall be collected from various spigots, not from hydrants, along the line for bacteriological analysis by a certified laboratory. If satisfactory bacteriological results are obtained, the lines may then be placed in service.
2. At Contract's option, pressure and leakage tests may be conducted during the disinfection process. All makeup water for these tests shall contain 50 PPM of chlorine. Should the pressure or leakage test fail, the disinfection process shall be repeated in its entirety.

**3.11 MEASUREMENTS**

- A. The Engineer, with a representative of the Contractor, will measure the number of linear feet of each size and type of water line laid from center of fitting to center of fitting, and from center of water main to center of hydrant. The length of service connections will be measured from center of main to the nearest edge of the meter box. No deductions will be made for space occupied by valves or fittings.

**PART 4 - Sec. 62-88. - As-built drawings.**

(a)The developer, and his/her engineer and/or contractor or his/her designee shall maintain current as-built drawings and survey the location and elevation of the infrastructure during the construction process. As-built drawings shall be maintained and available for inspection, upon the Director of Engineering's request.

(b)The engineer shall submit and certify a legible copy of the "as-built" drawings for the review, approval, and recordation to the Director of Engineering upon the completion of construction.

(c)As-built drawings shall include, but are not limited to, all of the information submitted on the engineering construction drawings as corrected, as well as the information listed below:

(1)General information.

a. Road names, as approved by the business and neighborhood services department, shall be identified on the plan view.

b. Underground utility location, if not noted, if not identified on the approved engineering plans, or if the exact location not previously identified. Additional information shall be identified on the profile view.

c. Relative features, including but not limited to street addresses, property line, natural features, etc. Additional information shall be identified on the plan view.

(2)Sewer-related information.

a. Mains.

1.Location of mains within right-of-way limits, if changed. Corrections shall be identified on the plan view.

2.Installed distances and slopes. Information shall be identified on the profile view.

3.Pipe type and size, if changed. Corrections shall be identified on the profile view.

4.Bore casing sizes and distances. Information shall be identified on the plan view.

5.Details on aerial creek crossings. Information shall be identified on the plan and profile view as needed.

6.Station location of special devices or appurtenances (e.g., anti-seep collars), measured from the downstream manhole. Information shall be identified on the profile view.

7.Information concerning distance to other utilities shall be identified on the profile view.

8.Station location of laterals, measured from the downstream manhole shall be identified on the plan view.

b. Manholes.

1. Manhole size and type (e.g., inside drop, outside drop). Information shall be identified on the profile view.
2. Elevations. Information shall be identified on the profile view.
  - i. Inverts in, inverts out, and drop inverts (top and bottom).
  - ii. Rims and vents. Elevations shall be provided in vertical feet.
- (3) Water-related information.
  - a. Location of mains within right-of-way limits, if changed. Corrections shall be identified on the plan view.
  - b. Installed distances. Information shall be identified on the plan view.
  - c. Pipe type and size, if changed. Corrections shall be identified on the plan view.
  - d. Bore casing sizes and distances. Information shall be identified on the plan view.
  - e. Station location of hydrants and associated leg lengths. Information shall be identified on the plan view.
  - f. Station location of valves and distances from the edge of pavement. Information shall be identified on the plan view.
  - g. Distance to other utilities. Information shall be identified on the plan view.
  - h. Station location of laterals and distances from the main to the meter box. Information shall be identified on the plan view.
  - i. Station location of special devices or appurtenances (e.g., backflow prevention devices, air-release valves, etc.) and associated details. Information shall be identified on the profile view.
  - j. Station location of meter box from the main and distances from the edge of pavement. Information shall be identified on the plan view.

(Ord. No. 04-17, § 1, 3-11-2004)

**PART 5 - Sec. 62-89. - Record drawings.**

(a) The engineer shall provide to the director of engineering "record" drawings and a digital copy of "record" drawings. Record drawings shall be signed and sealed by a professional engineer licensed to practice in North Carolina. Digital record drawings shall be supplied in format AutoCAD Release 14 or a later release, or in a format as specified by the director of engineering. All surveys shall be referenced to North Carolina grid coordinates. In addition the vertical monuments and datum from which the project was designed shall be designated on the map.

(b) As-built drawings shall be signed and sealed by a professional surveyor licensed to practice in North Carolina and shall reflect actual field location of infrastructure as installed. All information required on the as-built drawings shall be reflected on the record drawings.

(c) Recorded rights-of-way and easements shall be shown on the record drawings, including the required digital record drawings. Utility rights-of-way and easements shall be surveyed and recorded in accordance with the city's current rights-of-way, easements and encroachments policy. All recorded rights-of-way, easements, and encroachments shall be submitted to the director of engineering prior to final approval of the infrastructure.

(d) Record drawings shall be submitted prior to the certification and activation of the extension.

(Ord. No. 04-17, § 1, 3-11-2004; Ord. No. 05-13, § 3, 3-10-2005; Ord. No. 05-113, § 4, 12-8-2005)

#### **PART 6 - Sec. 62-90. - Certification.**

The engineer shall be responsible for sealing and certifying that materials and the construction of the extension and/or modification to the water distribution system and the wastewater collection system have met all the applicable rules, regulations, statutes, and ordinances of the City of Concord, State of North Carolina, the United States of America and the WSACC standards and is in substantial compliance with the approved engineering plans, specifications, supporting materials, and associated permits. A copy of the certification shall be provided to the Director of Engineering prior to final approval. Projects may be certified in phases.

(Ord. No. 04-17, § 1, 3-11-2004)

### **END OF SECTION**

<sup>1</sup> Rev 1 – Corrected formula for allowable leakage rate per AWWA Standard C600



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## SECTION 333000 - SANITARY SEWERS

***Please refer to the City of Concord details and specifications and WSACC specifications. Where WSACC and the City's standard specifications and details are similar, the City's shall apply. If conflicts arise between WSACC and specifications, WSACC shall take precedence.***

<https://www.wsacc.org/wsacc-standard-specifications/>

<https://apps.concordnc.gov/legacy/planningweb/CDO/TSM/Complete%20TSM.pdf>

## PART 1 - GENERAL

## 1.1 SCOPE

- A. The work covered by this Specification consists of the furnishing and installation of different sizes and types of sanitary sewer lines and appurtenances. All labor, tools, materials, equipment, and supervision necessary in the performances of the work shall be furnished by the Contractor. Sanitary sewer work shall include gravity sewers, manholes, service laterals and appurtenances and other work specified in the Specifications or as indicated on the Drawings.
- B. Work included in this Specification includes but is not limited to the following:
  - 1. Pipe Installation
  - 2. Manholes
  - 3. Connections to System
  - 4. Line Testing

## PART 2 - PRODUCTS

## 2.1 GRAVITY SEWER PIPE

- A. Sewer pipe for gravity lines shall comply with the following requirements for the type of pipe indicated in the Bid Schedule or shown on the Drawings.
  - 1. Ductile Iron Pipe
    - a. Ductile iron pipe for sewers shall conform to ANSI A21.51 for Type 2 laying conditions, suitable for 16 feet of cover over the pipe. Ductile iron pipe 12 inches in diameter and smaller shall be Class 350. Pipe joints shall be rubber-gasket, push-on joints as described in ANSI A21.11. Mechanical joints conforming to ANSI A21.11 shall be used where shown on the Drawings or specified.
    - b. Fittings shall be mechanical joint, Class 350, ductile iron, conforming to AWWA C110 or C153. Flanged joints, Class 125, with full face rubber gaskets shall

conform to AWWA C110. Fitting accessories shall conform to the fitting and pipe specifications above.

- c. All exterior surfaces of ductile iron sewer pipe and fittings for underground installation shall be given a coat of bituminous coating approximately 1-mil thick. All pipe and fittings specified for exposed, interior installation and to be painted shall not be bituminous coated.

## 2. PVC Sewer Pipe

- a. PVC pipe for sewers shall conform to ASTM D3034 with a wall thickness standard dimension ration of SDR21. Clean virgin resin conforming to ASTM 1784 shall be used for the manufacture of PVC pipe. The pipe shall be furnished in nominal lengths of 13 feet unless otherwise approved by the County and utility department having jurisdiction. Laying length shall not exceed 20 feet. The push-on joint pipe shall be furnished with bells made monolithically with the pipe. Rubber rings shall conform to ASTM D3212.

## 3. Cast Iron Soil Pipe

- a. Cast iron soil pipe for bury shall conform to ASTM A74 single hub or double hub, service weight pipe in 5-foot and 10-foot lengths with a rubber gasket compression joint. Exposed cast iron soil pipe shall conform to CISPI 301 with no-hub joints made with a neoprene, stainless steel shield and retaining clamp.

## 4. Pipe Piers

- a. Pipe on piers shall be either steel or ductile iron pipe as indicated on Drawings.
- b. All steel pipe for pier support shall be welded or seamless steel pipe of the size, thickness called for on the Drawings or this Specification, and at location, line and grade as established by the Engineer. All pipes shall conform to AWWA C200, Grade B, with a minimum yield strength of 35,000 PSI and shall be leak proof.
- c. All steel pipe on piers shall be coated inside and outside.
  - 1). Inside: All interior surfaces shall be coated with coal tar enamel conforming to AWWA C-203.
  - 2). Outside: All exterior surfaces shall be coated with one coat of zinc chromate primer. After sufficient drying time, a final coat of black rust inhibiting enamel paint shall be applied. Paint coating shall be Koppers' Glamortex No. 501 Enamel or equal.
- d. All steel straps, u-bolts, anchors, angle clips and other connections required to retain pipe on piers shall be shop coated with a rust inhibiting coating before shipment. All metal will be shop cleaned by Method SP3 "Power Tool Cleaning" and painted with a self-priming coal tar for coating.

## 2.2 MANHOLES

### A. Brick

1. Sewer brick shall conform to ASTM Designation C32, Grade MA suitable for sewage activity. Wall thickness shall be 8 inches for manholes. Mortar joints between courses shall not exceed ½-inch in thickness and vertical joints between brick shall not exceed ¼-inch on the inside. All joints shall be shove joints completely filled with mortar. Inside joints shall be struck. Brick manholes shall be installed only where shown on the Drawings.

### B. Precast Reinforced Concrete

1. Precast reinforced concrete manholes shall conform to ASTM Designation C478 with 4000 PSI concrete and a minimum of 5 inch wall thickness. Precast risers, conical or flat slab tops and grade rings shall be furnished. At Contractor's option flexible, watertight, rubber type "O" ring gaskets conforming to ASTM C443 or all-weather Butyl mastic in rope form may be used. Outside wrap/grouted joints shall be on the inside.
2. Each pipe opening in a precast concrete manhole shall be furnished with a flexible synthetic rubber manhole pipe connection. All necessary stainless steel clamps, draw bolts, nuts, gaskets and lubricants shall be furnished and properly installed. A short pipe sleeve shall be installed.

### C. Materials

1. All materials subject to deterioration shall be protected from dampness. Any materials which become damaged shall be removed from the site.
  - a. Mortar sand shall be clean, hard, durable, uncoated stone particles, free from lumps of clay, loam or organic matter.
  - b. Mortar for manhole masonry shall be mixed in the proportion by volume of one part Portland cement and two parts sand and sufficient clean water to produce proper consistency. Mortar shall be used so that it will be in place before the initial setting of the cement has taken place. Re-tempering of mortar in which cement has started to set will not be permitted.
  - c. In cold weather, and when directed by the Engineer to do so, an anti-freezing additive shall be added to the mortar in the proportions recommended by the Manufacturer.
  - d. Manhole steps shall be constructed of gray cast iron or a No. 3 deformed steel rod and polypropylene plastic and shaped as shown on Standard Drawings. Steps shall be dipped or painted with one coat asphaltum. Steps shall be spaced 12 inches to 16 inches apart.

- e. Each manhole shall be provided with best quality gray cast iron manhole frame and cover conforming to Standard Drawings. Cover shall be furnished with two pickholes. Two vent holes shall be located on the highest points of the cover. The seats of the frames and the covers shall be machined smooth.
- f. Vent pipes shall be 4 inches in diameter, Schedule 40 steel pipe of Grade "B": steel conforming to ASTM A-139. All joints shall be welded except one threaded joint may be made 18 inches below the top of vent to allow for positioning the vent in a downstream direction. Interior of vent shall have a minimum 3/32 inch thick coating of Coal Tar Epoxy. Exterior shall be blasted to Commercial Standard and primed with a zinc-rich primer. Primer shall be followed by two coats of Koppers Glamortex 501 Enamel (Olive Green), Tnemec Enduratone (AW22 Agean Sea) or Valspar High Gloss M&F Enamel V20 Series (G21 Spruce Green).

### PART 3 - EXECUTION

#### 3.1 HANDLING PIPE

- A. During loading at plat site, transportation, unloading and rehandling of pipe, every precaution shall be taken to prevent damage to the pipe, its lining and coating. Pipe shall be removed from truck in a careful manner to reduce banging of pipe against truck or unloading equipment. No pipe shall be dropped from the truck.
- B. Each section of pipe shall be delivered in the field as near as practicable to the place where it is to be installed. Pipes may be distributed along the side of the trench opposite to the spoil bank or stock-piled. Where necessary to move the pipe longitudinally along the trench, it shall be done in such a manner as not to injure the pipe or coating. Where pipe is placed in stockpiles, it shall be neatly piled and blocked with strips between piers.
- C. Any pipe that is damaged in any manner shall be set aside and marked with paint. The damaged portion may be cut off and the remainder used, if possible. If damaged pipe is not painted, it shall be removed from the job site immediately.

#### 3.2 INSTALLATION OF PIPE

- A. Each pipe shall be laid on a firm bed true to line and grade, and in such a manner as to form a close concentric joint with the adjoining pipe and to prevent sudden offsets of the flow line or disturbance of the line and grade.
- B. Deflections from a straight line or grade for force mains shall not exceed the deflection maximum recommended by the Pipe Manufacturer. If the specified alignment requires deflections in excess of those recommended by the Manufacturer, the Contractor shall provide either bends of pipes in shorter lengths, in such length and number that the angular deflections of the pipe joints are not exceeded.

- C. Cutting of pipe for closure or for other reasons shall be done in neat and workmanlike manner by a method which will not damage the pipe. All such cutting of pipe shall be done by mechanical cutters. The interior of the pipe shall be thoroughly swabbed and cleaned to remove all foreign matter before pipe is installed.
- D. For force mains, all fitting accessories such as nuts, bolts, gaskets, flanges shall be installed in a workmanlike manner and in accordance to the respective ASA or ASTM Specifications. In all cases, pipe shall be joined by using the proper primers, lubricants, and adhesives to procure a uniform invert and watertight joint.

### 3.3 BRACING, SUPPORTING AND ANCHORING PIPE

- A. All force main installed under this Contract shall be adequately secured against movement by the use of metal pipe supports, hangers, ties, inserts, clamps or concrete piers and blocking. The Contractor shall provide all items necessary to secure piping as required or directed to provide a complete and working installation at the Contractor's expense.
- B. All buried force main and fittings at bends shall be firmly wedged between the fittings and the undisturbed vertical face of the trench, with Class 2500 concrete or restrained with steel rods in order to prevent the fittings from being blown off the line when under pressure. Blocking shall be in accordance with AWWA Specification C600.
- C. All fittings placed at bends or breaks in grade in vertical planes shall be provided with adequate concrete embedment and straps at the base of slopes and shall be adequately anchored to the satisfaction of the Engineer, to resist the maximum test pressure at the top of the slopes.
- D. Exposed flange piping shall be secured by use of hangers, brackets, supports, piers or concrete blocking in such a manner that valves and equipment can be removed from the piping without the necessity for temporary blocking or support of the remaining piping. Tie rods and clamps shall be placed in the forms before piping shall be supported by at least one hanger, applied at the bell.

### 3.4 MANHOLES

- A. Manholes shall be built where shown on Drawings, or where directed by the Engineer. Construction materials used in manholes shall be as specified herein. Manholes shall be kept clean. Any visible leakage into the manhole shall be repaired by the Contractor at his expense.
- B. The inside diameter of the manhole shall be 4 feet for pipe sizes up to 24 inches and five feet for pipe sizes above 24 inches. Wall thickness shall vary with type of manhole.
- C. The invert channels shall be smooth and semi-circular in shape conforming to the inside of the adjacent sewer section. Changes in direction of flow shall be made with a smooth

curve of as large radius as the size of the manhole will permit. Changes in size and grade of the channels shall be made gradually and evenly. The invert channels may be formed directly in concrete on the manhole base or may be poured monolithically with the manhole base. The floor of the manhole outside the channels shall be smooth and shall slope at least 2 inches toward the channel. Excess mortar shall be cleaned from the channel, sloping floor and manhole steps. Frames shall be set in a full bed of mortar to proper grade. The exterior plaster shall be carried up over the flange of the frame.

- D. A brick stack may be constructed on top of the concrete manhole to fix cover at proper elevation. Brick stack length shall be limited to 12 inches. Brick stack shall be plastered with mortar.
- E. In streets and roadway shoulders, the covers shall be set to conform to the street or shoulder surface. Manholes not located in streets or roadway shoulders shall have covers set at elevations shown on the Drawings and at least 18 inches above ground level.

### 3.5 CONNECTIONS TO EXISTING SEWERS

- A. Pipe connections to existing manholes whether existing brick or concrete walls or to existing sanitary sewer lines shall be made in such a manner that finished work shall conform as nearly as practical to the essential applicable requirements specified for new manholes, including all necessary cutting, repair and reshaping.
- B. When indicated on the Drawings, connections to existing manholes shall be made over the existing invert trough. A new trough shall be reshaped to fit the new piping.
- C. Connections to existing sewer pipe, even if of different material than the specified pipe, shall be made with couplings, bushing adaptors or sleeves that will match pipe sizes. Contractor shall verify the proposed connection in the field before actually performing the work.

### 3.6 SEWER LATERAL SERVICES

- A. Each lateral as shown on the construction plan shall connect to the sanitary main with an 8 inch by 6-inch tee branch or wye and plug of material compatible with the sewer pipe as shown on the construction documents.
  - 1. After air testing of the sewer lines, sewer lateral shall extend to the right-of-way line (where applicable) and then be plugged with a plug compatible with the type of lateral pipe specified.
  - 2. The location of each lateral shall be indicated on the "Record Drawings" by number of feet from the centerline of the downhill manhole and indicated as right or left side of sewer line or by provided horizontal location to known and fixed points such as a building.

3. A stake shall also be driven at the end of the lateral at the right-of-way line.
  4. A permanent symbol shall be cut into the gutter to indicate location of lateral (where applicable).
  5. All sewer laterals shall be located at least ten (10) feet from the water tap and in no case shall sewer lateral and water tap be installed in the same trench.
- B. Where indicated on the Drawings, 8-inch by 6-inch tees and 6-inch laterals and accessories shall be furnished.

### 3.7 LINE TESTING

- A. After backfill is completed above the pipe and grade of the sewer shall be checked between manholes by the Contractor in the presence of the engineer of ` with a light or mirror and a good light circle shall show throughout the length of sewer.
- B. All gravity sewer lines shall be tested for exfiltration and/or infiltration. Tests shall be conducted with use of low-pressure air testing. All pumps, plugs, weirs, other equipment and labor required for successful tests shall be furnished by the Contractor.

#### 1. Low-Pressure Air Test

- a. The recommended practice for low-pressure air testing of sanitary sewer shall conform to ASTM Designation C828 as revised herein. The section of the sewer line to be tested shall be plugged. Low-pressure air shall be introduced into the plugged line. The amount and rate of air loss shall be used to determine the acceptability of the section being tested.
- b. The air test may be dangerous if, because of lack of understanding or carelessness, a line is improperly prepared. As a safety precaution, pressurizing equipment shall include a regulator or relief valve set to avoid over-pressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manholes during testing. All safety precautions shall be taken by Contractor to prevent damage, injury or loss to all persons and property.
- c. Test time and allowable air loss shall conform to ASTM C828.

#### 2. Infiltration

- C. Maximum allowable infiltration for all sewer lines, regardless of type of joint used, shall be 100 gallons per day per internal inch of pipe diameter per mile of sewer pipe. The pipe shall be tested in sections between manholes. The amount of leakage shall be measured by a suitable weir or other device as directed by the Engineer. When the infiltration exceeds the specified amount, correction shall be made to the satisfaction of the Engineer. Any visible leakage in manholes, joints, or exposed sewers shall be corrected



regardless of the amount of leakage. Both the leakage measurement and correction shall be done at the Contractor's expense.

### 3.8 AS-BUILTS

#### PART 4 - **Sec. 62-88. - As-built drawings.**

(a)The developer, and his/her engineer and/or contractor or his/her designee shall maintain current as-built drawings and survey the location and elevation of the infrastructure during the construction process. As-built drawings shall be maintained and available for inspection, upon the Director of Engineering's request.

(b)The engineer shall submit and certify a legible copy of the "as-built" drawings for the review, approval, and recordation to the Director of Engineering upon the completion of construction.

(c)As-built drawings shall include, but are not limited to, all of the information submitted on the engineering construction drawings as corrected, as well as the information listed below:

(1)General information.

a. Road names, as approved by the business and neighborhood services department, shall be identified on the plan view.

b. Underground utility location, if not noted, if not identified on the approved engineering plans, or if the exact location not previously identified. Additional information shall be identified on the profile view.

c. Relative features, including but not limited to street addresses, property line, natural features, etc. Additional information shall be identified on the plan view.

(2)Sewer-related information.

a. Mains.

1.Location of mains within right-of-way limits, if changed. Corrections shall be identified on the plan view.

2.Installed distances and slopes. Information shall be identified on the profile view.

3.Pipe type and size, if changed. Corrections shall be identified on the profile view.

4.Bore casing sizes and distances. Information shall be identified on the plan view.

5.Details on aerial creek crossings. Information shall be identified on the plan and profile view as needed.

6.Station location of special devices or appurtenances (e.g., anti-seep collars), measured from the downstream manhole. Information shall be identified on the profile view.

7.Information concerning distance to other utilities shall be identified on the profile view.

8.Station location of laterals, measured from the downstream manhole shall be identified on the plan view.

b. Manholes.

1. Manhole size and type (e.g., inside drop, outside drop). Information shall be identified on the profile view.

2. Elevations. Information shall be identified on the profile view.

i. Inverts in, inverts out, and drop inverts (top and bottom).

ii. Rims and vents. Elevations shall be provided in vertical feet.

(3) Water-related information.

a. Location of mains within right-of-way limits, if changed. Corrections shall be identified on the plan view.

b. Installed distances. Information shall be identified on the plan view.

c. Pipe type and size, if changed. Corrections shall be identified on the plan view.

d. Bore casing sizes and distances. Information shall be identified on the plan view.

e. Station location of hydrants and associated leg lengths. Information shall be identified on the plan view.

f. Station location of valves and distances from the edge of pavement. Information shall be identified on the plan view.

g. Distance to other utilities. Information shall be identified on the plan view.

h. Station location of laterals and distances from the main to the meter box. Information shall be identified on the plan view.

i. Station location of special devices or appurtenances (e.g., backflow prevention devices, air-release valves, etc.) and associated details. Information shall be identified on the profile view.

j. Station location of meter box from the main and distances from the edge of pavement. Information shall be identified on the plan view.

(Ord. No. 04-17, § 1, 3-11-2004)

PART 5 - Sec. 62-89. - Record drawings.

(a) The engineer shall provide to the director of engineering "record" drawings and a digital copy of "record" drawings. Record drawings shall be signed and sealed by a professional engineer licensed to practice in North Carolina. Digital record drawings shall be supplied in format AutoCAD Release 14 or a later release, or in a format as specified by the director of engineering. All surveys shall be referenced to North Carolina grid coordinates. In addition the vertical monuments and datum from which the project was designed shall be designated on the map.

(b) As-built drawings shall be signed and sealed by a professional surveyor licensed to practice in North Carolina and shall reflect actual field location of infrastructure as installed. All information required on the as-built drawings shall be reflected on the record drawings.

(c)Recorded rights-of-way and easements shall be shown on the record drawings, including the required digital record drawings. Utility rights-of-way and easements shall be surveyed and recorded in accordance with the city's current rights-of-way, easements and encroachments policy. All recorded rights-of-way, easements, and encroachments shall be submitted to the director of engineering prior to final approval of the infrastructure.

(d)Record drawings shall be submitted prior to the certification and activation of the extension.

(Ord. No. 04-17, § 1, 3-11-2004; Ord. No. 05-13, § 3, 3-10-2005; Ord. No. 05-113, § 4, 12-8-2005)

PART 6 - Sec. 62-90. - Certification.

The engineer shall be responsible for sealing and certifying that materials and the construction of the extension and/or modification to the water distribution system and the wastewater collection system have met all the applicable rules, regulations, statutes, and ordinances of the City of Concord, State of North Carolina, the United States of America and the WSACC standards and is in substantial compliance with the approved engineering plans, specifications, supporting materials, and associated permits. A copy of the certification shall be provided to the Director of Engineering prior to final approval. Projects may be certified in phases.

(Ord. No. 04-17, § 1, 3-11-2004)

END OF SECTION

## SECTION 334100 - STORM DRAINAGE

## PART 1 - GENERAL

## 1.1 GENERAL

- A. The Contractor shall furnish all materials, equipment, and labor necessary to perform all work under this heading, as indicated on the Drawings and required by the Specifications. All work shall be in accordance with the latest edition of the NCDOT Standard Drawings & Specifications for Highway Construction. Additional details from the City of Concord Development Standards may apply as noted on the drawing.
- B. CMP
- C. Polyethylene Pipe ASTM D-3350 (solid and perforated)
- D. ABS ASTM 2752 SDR-35
- E. PVC ASTM 3034 SDR-35
- F. PVC ASTM 2729
- G. HDPE – ADSN-12

## 1.2 SUBMITTALS

- A. Product Data: Submit copies of manufacturer's detailed materials and fabrication specifications and installation instructions. Include catalog cuts of hardware, anchors, fastenings, and other data as required. Indicate by transmittal form that copy of each instruction has been distributed to the installer.
- B. Shop Drawings:
  - 1. Submit proposed manufacturer's catalog drawings.
  - 2. Submit proposed manufacturer's cut sheets for precast structures.
  - 3. Clearly show the work to be performed by other trades.

## 1.3 UNLOADING AND HANDLING

- A. All pipes shall be unloaded and handled with reasonable care. Pipe shall not be rolled or dragged over gravel or rock during handling. When any of the pipe is damaged during unloading or handling, the engineer of record or his/her representative will reject the section of pipe as being unfit for installation, and the Contractor shall remove such rejected pipe from the project.

## 1.4 PREPARATION OF PIPE FOUNDATION

- A. The pipe foundation shall be prepared in accordance with the applicable method shown on the Drawings and shall be true to line and grade and uniformly firm. Where necessary, the invert grade shall be cambered by an amount sufficient to prevent the development of sag or back slope in the flow line. The amount of camber used will be determined by the engineer of record or his/her representative or as applicable using NCDOT latest Standard Specifications.

- B. Where the foundation material is found to be of poor supporting value or of rock, the engineer of record or owner's geotechnical engineer may make minor adjustment in the location of the pipe, to provide a more suitable foundation. Where this is not practical, the foundation shall be conditioned by removing the existing foundation material by undercutting to the depth as directed by the engineer of record or owner's geotechnical engineer, within the limits established on the Drawings, and backfilling with either a suitable local material secured from unclassified excavation, or borrow excavation at the nearest accessible location along the project, or foundation conditioning material consisting of crushed stone or gravel or a combination of sand and crushed stone or gravel, approved by the engineer of record or owner's geotechnical engineer as being suitable for the purpose intended. The selection of the type of backfill material to be used for foundation conditioning will be made by the engineer of record or owner's geotechnical engineer.
- C. When necessary, the Contractor shall provide for the temporary diversion of water in order to maintain the pipe foundation in a dry condition.

#### 1.5 LAYING PIPE

- A. The pipe shall be carefully laid on the prepared foundation in accordance to the manufacturers specifications.
- B. All bedding shall be in accordance with SC DOT standard drawing number 714-005 and supplemental tech spec SC-M-714.

#### 1.6 BACKFILLING

- A. Backfill shall be as per ASTM F449. The fill around the pipe shall be placed in accordance with the applicable method shown on the Drawings and shall be placed in layers not to exceed six (6) inches loose, unless otherwise approved by the engineer of record or owner's geotechnical engineer and compacted to the density required by Sub-article 235-4(C). All backfill material shall have been approved by the engineer of record or owner's geotechnical engineer. Select backfill material shall be used.
- B. Care shall be taken during backfill and compaction operations to maintain alignment and prevent damage to the joints. The backfill shall be kept free from stones, frozen lumps, chunks of highly plastic clay, or other objectionable material.
- C. All pipe backfill areas shall be graded and maintained in such a condition that erosion or saturation will not damage the pipe bed or backfill.
- D. Heavy equipment shall not be operated over any pipe until it has been properly backfilled and has a minimum cover as required by the Drawings. Where any part of the required cover is above the proposed finish grade, the Contractor shall place, maintain, and finally remove such material at no cost to the Owner. Pipe which becomes misaligned, shows excessive settlement, or has been otherwise damaged by the Contractor's operations shall be removed and replaced by the Contractor at no cost to the Owner.

1.7 MAINTENANCE

- A. The Contractor shall maintain all pipe installations in a condition such that they will function continuously from the time the pipe is installed until the project is accepted.

END OF SECTION

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SECTION 003132 - GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

- A. This Document with its referenced attachments are not part of the Contract Documents.
- B. The reports listed identify properties of below grade conditions and offers recommendations for the design of foundations, prepared primarily for the use of Architect and Engineers.
- C. The recommendations described shall not be construed as a requirement of this Contract, unless specifically referenced in Contract Documents.
- D. By its nature, the reports cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from these reports, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.
- E. The attachments, prepared by **Terracon**, are as follows:
  - 1. March 3, 2023 – Terracon Project 71225209 – Timber Pile Recommendation Letter, Northwest Community Park
  - 2. November 23, 2022 – Terracon Project 71225209 – Northwest Community Park Geotechnical Engineering Report

END OF SECTION



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March 3, 2023

Woolpert, Inc.  
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Charlotte, North Carolina 28227

Attn: Mr. David Welling, AIA, CCCA, LEED®  
E: David.Welling@woolpert.com  
P: (704) 526-3130

Re: Timber Pile Recommendations Letter  
Northwest Community Park - Boardwalk  
1252 Cox Mill Rd  
Concord, North Carolina  
Terracon Project No. 71225209

Dear Mr. Welling,

Terracon is pleased to provide the following timber pile foundation recommendations for the project listed above. This report provides recommendations based on correspondence between Terracon and Woolpert in February 2023. The following recommendations are based in part on the results of our previous *Geotechnical Engineering Report – Northwest Community Park*, Terracon Project No. 71225209, dated November 23, 2022.

## **Boardwalk Foundation Recommendations**

It is our understanding that driven timber piles are the preferred means to support the boardwalk proposed on the western portion of the development area (bordering the wetlands). Design recommendations for driven timber piles are presented below.

### **Timber Pile Design Recommendations**

The proposed structure can be supported by driven timber piles. For the purposes of our evaluation, we have assumed 8-inch diameter piles will be installed for the boardwalk foundations. The piles should extend through any fill and alluvial materials and bear in the underlying residual soils or partially weathered rock identified in our nearby borings.

Provided the piles are driven to refusal, an 8-inch diameter timber pile should provide an allowable axial capacity of 20 tons (40 kips); however, we do not anticipate driving refusal

## Timber Pile Recommendations Letter

NC Park – Building 4 Culvert Crossing ■ Statesville, North Carolina  
February 6, 2023 ■ Terracon Project No. 71221095



conditions within the upper 20 feet. Therefore, if piles are terminated within the stiff/medium dense residual soils identified in our nearby borings, an allowable axial capacity of 5 to 10 tons (10 to 20 kips) could be used in design for piles driven to depths of approximately 20 to 40 feet. Allowable capacities are based on a minimum factor-of-safety equal to 2.5. The allowable uplift capacity should be taken as approximately 90 percent of the weight of the pile. If driven to depths of at least 20 feet, settlement of the bearing soils should be minimal based on the allowable axial capacities listed above, and most of the settlement will occur from elastic compression of the piles.

Timber piles should be treated Southern Yellow Pine and meet the requirements of ASTM D25 for round timber end bearing piles. The pile size should be specified in terms of a minimum tip circumference (e.g., 25 inches for 8-inch diameter). Pressure-treat timber piles according to AWPAC3. Apply the treatment to the piles after all millwork is completed.

We recommend that piles be spaced on-center no closer than three times the pile butt diameter or width. The minimum spacing should be maintained to prevent the pile group compression load capacity from being significantly less than the summation of individual pile capacities. This spacing restriction also serves to limit surface heave and to reduce the possibility of damaging previously installed piles.

## Timber Pile Construction Considerations

The hammer used for this project should be large enough to penetrate the pile through the existing fill and alluvial soils and into the underlying residual soils or partially weathered rock without introducing excessive driving stresses. Based upon the subsurface conditions and our previous experience, Terracon recommends that a hammer with a rated energy of at least 10,000 foot-pounds be used to drive the piles. Terracon requests an opportunity to perform pile driving analyses after the type of hammer, pile cushion and driving procedures are proposed by the contractor.

In order to minimize damage to the timber piles during driving, we recommend limiting the compressive driving stress to three times the allowable design stress and using a steel driving shoe attached to the pile toe. Driving should be terminated immediately if refusal (i.e., 4 blows-per-inch) is reached to minimize damaging the piles. Overdriving of the timber piles can result in the crushing of fibers or brooming of the pile head.

Actual tip elevations should be determined in the field by a representative of Terracon during pile driving operations, using a suitable pile driving formula. The driving resistance should be determined by either the Engineering News Record Formula or by a wave equation driving analysis performed by the geotechnical engineer. Complete driving and installation records should be maintained. For each pile driven, driving records should include as a minimum:

- pile type and dimensions
- pile tip and cut-off elevations

**Timber Pile Recommendations Letter**

NC Park – Building 4 Culvert Crossing ■ Statesville, North Carolina  
February 6, 2023 ■ Terracon Project No. 71221095



- butt deviation
- time of driving
- plumbness
- penetration resistance values for each foot
- any incidents relevant to the pile foundation installation such as pile damage or break-down of driving equipment.

**Closure**

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely, \_\_\_\_\_

**Terracon Consultants, Inc.**



Janette M. Prosser, P.E.  
Senior Engineer

Christopher R. Briggs, P.E.  
Geotechnical Department Manager



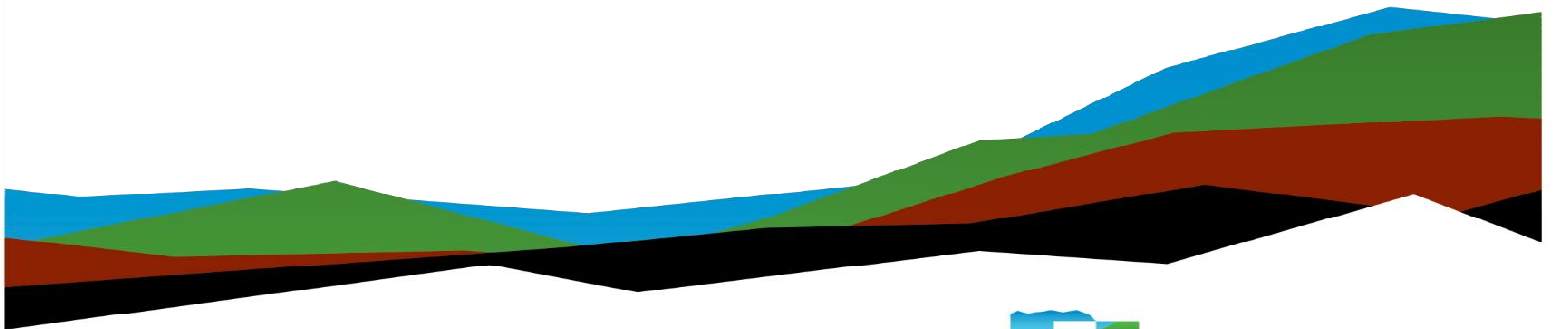
# Northwest Community Park

## Geotechnical Engineering Report

November 23, 2022 | Terracon Project No. 71225209

### Prepared for:

Woolpert, Inc.  
13860 Ballantyne Corporate Place,  
Suite 425  
Charlotte, North Carolina 28227



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November 23, 2022

Woolpert, Inc.  
13860 Ballantyne Corporate Place, Suite 425  
Charlotte, North Carolina 28227

Attn: Mr. David Welling  
P: (704) 526-3130  
E: David.Welling@woolpert.com

Re: Geotechnical Engineering Report  
Northwest Community Park  
1252 Cox Mill Rd  
Concord, North Carolina  
Terracon Project No. 71225209

Dear Mr. Welling:

We have completed the scope of Geotechnical Engineering services for the above referenced project in general accordance with Terracon Proposal No. P71225209 dated October 7, 2022. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and floor slabs for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,



Janette M. Prosser, P.E.  
Senior Engineer

Christopher R. Briggs, P.E.  
Geotechnical Department Manager

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**Exploration and Testing Procedures**

**Photography Log**

**Site Location and Exploration Plans**

**Exploration and Laboratory Results**

**Supporting Information**

**Note:** This report was originally delivered in a web-based format. **Blue Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the  Terracon logo will bring you back to this page. For more interactive features, please view your project online at [client.terracon.com](http://client.terracon.com).

Refer to each individual Attachment for a listing of contents.

## Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed park to be located at 1252 Cox Mill Rd in Concord, North Carolina. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Seismic site classification per 2018 NCSBC
- Site preparation and earthwork
- Demolition considerations
- Dewatering considerations
- Foundation design and construction
- Floor slab design and construction
- Lateral earth pressures
- Pavement design and construction

The geotechnical engineering Scope of Services for this project included the advancement of test borings, laboratory testing, engineering analysis, and preparation of this report.

Drawings showing the site and boring locations are shown on the [Site Location](#) and [Exploration Plan](#), respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs and as separate graphs in the [Exploration Results](#) section.

## Project Description

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
<b>Information Provided</b>	<ul style="list-style-type: none"> <li>■ "City of Concord, J.E. "Jim" Ramseur Park, Schematic Design Preliminary Pricing Only," dated March 30, 2022, with proposed boring locations revised October 3, 2022.</li> <li>■ Email and telephone communication between Woolpert and Terracon.</li> <li>■ "Preliminary Geotechnical Engineering Report, Northwest Community Park," dated March 4, 2022, Terracon Project No. 71215219.</li> </ul>
<b>Project Description</b>	<p>The proposed project includes the construction of a new community park that will connect into greenway trails along Clarks Creek. Additionally, it will include several sports courts, playground areas, dog parks, and at-grade parking and roads.</p>
<b>Proposed Structure</b>	<p>Structures associated with this phase of the project includes restrooms and lightly loaded structures.</p>
<b>Building Construction</b>	<p>The construction will likely consist of wood or light metal framing with slab-on-grade floors.</p> <p>Building support is typically achieved using a combination of shallow foundation systems and/or a monolithic slab with thickened load-bearing areas</p> <p>Building foundations are expected to be founded on shallow spread footings.</p>
<b>Finished Floor Elevation</b>	<p>Finished floor elevation for the buildings is generally within 5 to 10 feet of existing grade.</p>
<b>Maximum Loads</b>	<p>We will use the following loads in estimating settlement based on our experience with similar projects.</p> <ul style="list-style-type: none"> <li>■ Columns: 30 to 50 kips</li> <li>■ Walls: 3 to 5 kips per linear foot (klf)</li> <li>■ Slabs: 150 pounds per square foot (psf)</li> </ul>
<b>Grading/Slopes</b>	<p>Proposed finished grade elevation for the building pad is unknown, but expected to be within 5 feet of existing grades. Approximately 5 to 10 feet of cut and fill is anticipated to be required to develop final grade, excluding remedial grading requirements.</p> <p>Final slopes are planned with a maximum height of 10 feet and an inclination of 2H:1V (Horizontal: Vertical) or flatter.</p>
<b>Below-Grade Structures</b>	<p>Wet-well for pump station, located in southwest portion of the site.</p>

Item	Description
<b>Free-Standing Retaining Walls</b>	Concrete and segmental block walls, ranging in height from 0 to 12 feet. The retaining walls are generally located in the vicinity of the splash pad, northwest portion of the parking lot, and dog park pavilion.
<b>Pavements</b>	<p>A preferred pavement surfacing has not been identified to us as part of the preliminary information. Asphalt/Concrete surfacing is common in the area for projects of this nature and is the assumed preference.</p> <p>For rigid (concrete) pavements, the anticipated ACI traffic categories and daily truck traffic will be assumed to consist of:</p> <ul style="list-style-type: none"> <li>■ Category A: Car parking areas and access lanes, 1 truck per day</li> <li>■ Category B: Entrance and truck service lanes, 1 truck per day</li> <li>■ Category E: Garbage or fire truck lanes, 1 truck per week</li> </ul> <p>For flexible (asphalt) pavements, we assume that the traffic classification will consist of:</p> <ul style="list-style-type: none"> <li>■ Class I: Parking stalls for autos and pickup trucks</li> <li>■ Class II: Traffic consisting of home delivery trucks, trash pickup</li> </ul> <p>The pavement design period is 20 years.</p>
<b>Building Code</b>	2018 North Carolina State Building Code (NCSBC)

Terracon should be notified if any of the above information is inconsistent with the planned construction, especially the grading limits, as modifications to our recommendations may be necessary.

## Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
<p><b>Parcel Information</b></p>	<p>The project is located at 1252 Cox Mill Rd in Concord, North Carolina.</p> <p>Approximately 27.6 acres</p> <p>Cabarrus County Parcel IDs:</p> <ul style="list-style-type: none"> <li>■ 02-011-0017.10</li> <li>■ 02-011-0017.20</li> </ul> <p>Latitude 35.395592 / Longitude -80.733422 (approximate)</p> <p>See <a href="#">Site Location</a>.</p>
<p><b>Existing Improvements</b></p>	<p>The site is mostly wooded. Several residential, barn, and storage structures are present near the center of the site.</p>
<p><b>Current Ground Cover</b></p>	<p>Moderately to heavily wooded throughout with some clearing near the existing structures and along the entry road.</p>
<p><b>Existing Topography</b></p>	<p>Based on provided topographic data, existing elevations generally slope downward from the east to west and vary between about 675 feet and 605 feet. A drainage feature is located in the southern portion of the site. Additionally, a stockpile is located on the western portion of the property.</p>
<p><b>Geology</b></p>	<p>Piedmont Physiographic Region. See <a href="#">Geology</a>.</p>

We also collected photographs at the time of our field exploration program. Representative photos are provided in our [Photography Log](#).

## Geotechnical Characterization

### Geology

The project site is located in the Piedmont Physiographic Province, an area underlain by ancient igneous and metamorphic rocks. The residual soils in this area are the product of in-place chemical weathering of rock. The typical residual soil profile consists of clayey soils near the surface where soil weathering is more advanced, underlain by sandy silts and silty sands that generally become harder with depth to the top of parent bedrock. Alluvial soils are typically present within floodplain areas along creeks and rivers in the Piedmont. According to the 1985 Geologic Map of North Carolina, the site is within the Charlotte Belt. The bedrock underlying the site generally consists of metamorphosed quartz diorite.

The boundary between soil and rock in the Piedmont is not sharply defined. A transitional zone termed “partially weathered rock” is normally found overlying the parent bedrock. Partially weathered rock (PWR) is defined for engineering purposes as

residual material with a standard penetration test resistance exceeding 100 blows per foot. The transition between hard/dense residual soils and partially weathered rock occurs at irregular depths due to variations in degree of weathering.

Groundwater is typically present in fractures within the partially weathered rock or underlying bedrock in upland areas of the Piedmont. Fluctuations in groundwater levels on the order of 2 to 4 feet are typical in residual soils and partially weathered rock in the Piedmont, depending on variations in precipitation, evaporation, and surface water runoff. Seasonal high groundwater levels are expected to occur during or just after the typically cooler months of the year (November through April).

### Subsurface Profile

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of the site. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the **Exploration Results** and the GeoModel can be found in the **Figures** attachment of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	<b>Surficial Materials</b>	Topsoil, Gravel
2	<b>Fill</b>	SILT with varying amounts of sand, sandy LEAN CLAY, clayey SAND
3	<b>Alluvial Soil</b>	Silty SAND, LEAN CLAY with varying amounts of sand
4	<b>High Plasticity Residual Soil</b>	FAT CLAY with varying amounts of sand, sandy ELASTIC SILT
5	<b>Low Plasticity Residual Soil</b>	Clayey SAND, silty SAND, SILT with varying amounts of sand, LEAN CLAY with varying amounts of sand
6	<b>Partially Weathered Rock (PWR)</b>	Sampled as silty SAND

## Groundwater Conditions

The boreholes were observed while drilling and after completion for the presence and level of groundwater. The water levels observed in the boreholes can be found on the boring logs in [Exploration Results](#), and are summarized in the following table.

<b>Boring Number</b>	<b>Approximate Depth to Observed Groundwater (feet) <sup>1</sup></b>	<b>Estimated Elevation of Observed Groundwater (feet) <sup>2</sup></b>
<b>B-108</b>	10.5	601.5
<b>B-111</b>	5	600
<b>B-112</b>	8.5	603.5

1. Below the ground surface.
2. Elevations estimated from site topographic map.

Groundwater was not observed in the remaining borings while drilling, or for the short duration the borings could remain open. However, this does not necessarily mean the borings terminated above groundwater, or the water levels summarized above are stable groundwater levels. Due to the low permeability of the soils encountered in the borings, a relatively long period may be necessary for a groundwater level to develop and stabilize in a borehole. Long term observations in piezometers or observation wells sealed from the influence of surface water are often required to define groundwater levels in materials of this type.

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

## Seismic Site Class

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site Classification is required to determine the Seismic Design Category for a structure. The Site Classification is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard

penetration resistance, or undrained shear strength in accordance with Section 20 of ASCE 7 and the North Carolina State Building Code (NCSBC).

Description	Value
<b>2018 North Carolina State Building Code (NCSBC) <sup>1</sup></b>	C <sup>2</sup>

1. Seismic site classification in general accordance with the 2018 NCSBC, which refers to ASCE 7.
2. The 2018 NCSBC uses a site profile extending to a depth of 100 feet for seismic site classification. Borings at this site were extended to a maximum depth of 35 feet. The site properties below the boring depth to 100 feet were estimated based on our experience and knowledge of geologic conditions of the general area.

## Percolation/Infiltration

Hydraulic conductivity testing was performed on an undisturbed sample taken at a depth of approximately 0.5 to 2 feet beneath the existing ground surface in Boring B-116. A below grade stormwater detention system is proposed in this area. The testing was performed in general accordance with ASTM D5084 and the results can be found in the following table. Refer to [Exploration Results](#) for detailed testing results.

Location, Depth (ft)	Soil Type <sup>1</sup>	Approximate Infiltration Rate (inches per hour)
<b>B-116, 0.5 - 2</b>	CH	0.001

1. Soil type determined in accordance with the Unified Soil Classification System.

## Geotechnical Overview

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations provided in this report are implemented in the design and construction phases of this project.

Support of floor slabs, foundations, and pavements on or above existing fill materials or alluvial soils is discussed in this report. However, even with the recommended construction procedures, there is inherent risk for the owner that compressible fill or unsuitable material, within or buried by the fill or alluvial soils, will not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill or alluvial soils, but can be reduced by following the recommendations



contained in this report. To take advantage of the cost benefit of not removing the entire amount of undocumented fill or alluvial soils, the owner must be willing to accept the risk associated with building over these materials following the recommended reworking of the material. Should this be the case, development may be supported on a shallow foundation system.

Stockpiled material is located in the vicinity of borings B-114 and B-115 and encountered fill in the stockpile ranging from approximately 17 to 22 feet in depth. This stockpiled material appears relatively appropriate to be re-used as engineered fill. If observed, organic and man-made materials should be removed.

Provided unsuitable soils are addressed as recommended herein, the proposed structure may be supported on conventional strip and spread footings with a net allowable bearing pressure of 2,500 psf. Further details and recommendations are provided herein.

Based on the results of our field testing and the 2018 North Carolina State Building Code (NCSBC), the seismic classification is C.

Based on the results of our laboratory testing, many of the soils encountered may be wetter than optimum moisture content. Reusing these soils as structural fill will likely require drying to reach optimum moisture and may lead to significant delays during construction. Remediation options may include removal and replacement, scarifying and drying, and lime/cement treatment.

Based on the results of our laboratory tests and visual classifications, near surface of high plasticity soils (CH and MH materials) were identified in some of our borings. These soils can be moisture sensitive and difficult to work. Undercutting and replacement of these soils may become necessary during construction. We recommend that the contractor be requested to submit a unit rate cost for removal (undercutting) and replacement as part of the bidding process.

An alternative to the removal and replacement of high plasticity soils is stabilization with lime or cement. The stabilization process alters the chemical characteristics of soil and produces a usable material. This alternative would generally entail the undercutting of high elasticity soils and thoroughly mixing the undercut soils with lime or cement. Once the soil has been properly mixed with an appropriate percentage of lime or cement, the soil can be reused as structural fill. Additional laboratory work may be required to determine the appropriate percentage of lime or cement to apply.

The residual soils encountered at the boring locations may be excavated with conventional construction equipment, such as bulldozers, backhoes, and trackhoes. However, difficult excavation of relatively shallow Partially Weathered Rock (PWR) may be encountered within the site. We recommend that the contractor submit unit rates for difficult excavations in their bid. Further details and recommendations are provided herein.

Our opinion of pavement section thickness design has been developed based on our understanding of the intended use, assumed traffic, and subgrade preparation recommended herein using methodology contained in ACI 330 "Guide to Design and Construction of Concrete Parking Lots" / NAPA IS-109 "Design of Hot Mix Asphalt Pavements" and adjusted with consideration to local practice. The **Pavements** section includes minimum pavement component thickness.

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the **Exploration Results**), engineering analyses, and our current understanding of the proposed project. The **General Comments** section provides an understanding of the report limitations.

## Earthwork

Earthwork is anticipated to include demolition, clearing and grubbing, excavations, and structural fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

### Demolition

Portions of the proposed park will be constructed within the footprint of an existing home, barn, and metal pre-fab building, which will need to be demolished, as well as utilities. We recommend existing foundations, slabs, and utilities be removed from within proposed building footprint and improvements, and at least 5 feet beyond the outer edge of foundations.

For areas outside the proposed building footprints and foundation bearing zones, existing foundations, floor slabs, and utilities should be removed where they conflict with proposed utilities, retaining walls, and pavements. In such cases, existing foundations, floor slabs, and utilities should be removed to a depth of at least 2 feet below the affected utility or design pavement subgrade elevation.

### Site Preparation

Site preparation should begin with the demolition of the existing structures/pavements and debris removal. As part of the demolition, buried utilities and/or concrete foundations should also be removed. Existing utilities that are to be abandoned should be removed or filled with grout. The excavations resulting from foundation and utility removal should be properly backfilled with compacted structural fill as described in the

following subsections. Utilities that are to remain in service should be accurately located horizontally and vertically to minimize conflict with new foundation construction.

Mature trees are located within or near the footprint of some of the proposed buildings, which will require removal at the onset of construction. Tree root systems can remove substantial moisture from surrounding soils. Where trees are removed, the full root ball and all associated dry and desiccated soils should be removed. The soil materials which contain less than 5 percent organics can be reused as structural fill provided the material is moisture conditioned and properly compacted.

Where fill is placed on existing slopes steeper than 5H:1V, benches should be cut into the existing slopes prior to fill placement. The benches should have a minimum vertical face height of 1 foot and a maximum vertical face height of 3 feet and should be cut wide enough to accommodate the compaction equipment. This benching will help provide a positive bond between the fill and natural soils and reduce the possibility of failure along the fill/natural soil interface.

## Subgrade Preparation

Site preparation should begin with the demolition of the existing structures/pavements and debris removal. As part of the demolition, buried utilities and/or concrete foundations should also be removed. Existing utilities that are to be abandoned should be removed or filled with grout. The excavations resulting from foundation and utility removal should be properly backfilled with compacted structural fill as described in the following subsections. Utilities that are to remain in service should be accurately located horizontally and vertically to minimize conflict with new foundation construction.

Existing vegetation, topsoil, and any otherwise unsuitable material should be removed from the construction areas prior to placing fill. Stripped materials consisting of vegetation and organic materials should be wasted off site, or used to vegetate landscaped areas or exposed slopes after completion of grading operations. The subgrade should be proofrolled with an adequately loaded vehicle such as a fully-loaded tandem-axle dump truck. The proofrolling should be performed under the observation of the Geotechnical Engineer or representative. Proofrolling should be performed after a suitable period of dry weather to avoid degrading an otherwise acceptable subgrade. Areas excessively deflecting under the proofroll should be delineated and subsequently addressed by the Geotechnical Engineer.

Based on the results of our laboratory tests and visual classifications, near-surface high plasticity soils (CH and MH materials) were identified in multiple borings. These soils can be moisture sensitive and difficult to work. If high plasticity soils ( $LL \geq 50$  or  $PI \geq 20$ ) are present at proposed subgrade elevations outside of the building footprints and appear stable when prepared in accordance with the recommendations herein, they may be acceptable to be left in place. If they do not appear stable, or are encountered within

building footprints, we recommend they are undercut at least 3 feet below proposed foundations and 18 inches below proposed pavement or slab subgrade elevations. High plasticity soils should not be used as structural fill beneath structures, or within three feet of proposed grades beneath pavements. They may be used as fill beneath non-structural areas, such as planters and green spaces. We recommend that the contractor be requested to submit a unit rate cost for removal (undercutting) and replacement as part of the bidding process.

If subgrade soils are unsuitable, they will require removal and replacement; however, if they are unstable due to excessive moisture, the most economical solution for remediation may be to scarify, dry and recompact the material. This remediation is most effective during the typically hotter months of the year (May to October). If construction is performed during the cooler period of the year, the timeline for scarifying, drying, and recompacting typically increases considerably and may lead to alternative remediation solutions. These solutions can include overexcavation of some or all of the unstable material to be backfilled with either approved structural fill or geotextile and ABC Stone. Potential undercutting can be reduced if the site preparation work is performed during a period of dry weather and if construction traffic is kept to a minimum on prepared subgrades. We recommend that the contractor submit a unit rate cost for undercutting as part of the bidding process.

Based on the results of our laboratory testing, many of the soils encountered may be wetter than optimum moisture content. Reusing these soils as structural fill will likely require drying to reach optimum moisture and may lead to significant delays during construction. Remediation options may include removal and replacement, scarifying and drying, and lime/cement treatment.

An alternative to the removal and replacement of high plasticity soils is stabilization with lime or cement. The stabilization process alters the chemical characteristics of soil and produces a usable material. See [Soil Stabilization](#) section for more details.

All exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of 10 inches, moisture conditioned as necessary, and compacted per the compaction requirements in this report. Compacted structural fill soils should then be placed to the proposed design grade and the moisture content and compaction of subgrade soils should be maintained until foundation or pavement construction.

Based upon the subsurface conditions determined from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable; however, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

## Existing Fill

Borings B-104, B-108, B-03, and B-04 encountered previously placed fill to depths ranging from about 3 to 5.5 feet. Borings B-114 and B-115 encountered fill in the stockpile ranging from approximately 17 to 22 feet in depth.

We have no records to indicate the degree of control, and consequently, the fill is considered unreliable for support of foundation loads. Support of floor slabs and pavements on or above existing fill soils is discussed in this report. However, even with the recommended construction procedures, inherent risk exists for the owner that compressible fill or unsuitable material, within or buried by the fill will, not be discovered. This risk of unforeseen conditions cannot be eliminated without completely removing the existing fill but can be reduced by following the recommendations contained in this report.

If the owner elects to construct the footings and floor slabs on the existing fill, the following protocol should be followed. Once the planned grading has been completed, the entire area should be proof-rolled with heavy, rubber tire construction equipment, to aid in delineating areas of soft, or otherwise unsuitable soil. The bottom of footings should be checked with hand augers and Dynamic Cone Penetrometer (DCP) testing. Once any areas of unsuitable materials have been remediated, and the subgrade has passed the proof-roll/DCP testing, the existing soils that were removed can be evaluated for reuse as structural fill.

If the owner elects to construct pavements on the existing fill, the following protocol should be followed. Once the planned subgrade elevation has been reached, the entire pavement area should be proofrolled. Areas of soft or otherwise unsuitable material should be undercut and replaced with either new structural fill or suitable, existing on site materials.

The stockpiled soil in areas of B-114 and B-115 appear relatively appropriate to be re-used as engineered fill. Based on our borings, layers of organic materials or debris were observed and should be removed, prior to re-use as engineered fill material.

## Alluvial Soils

Boring B-111 encountered alluvial soils to a depth of approximately 8 feet. Even with the recommended construction procedures, there is an inherent risk for the owner that soft or compressible soils will result in settlements that are larger than anticipated. Due to the elevations at which groundwater was encountered in these borings, it may not be practical to remove the alluvial soils. This risk of excessive settlements due to the presence of alluvial soils can be reduced by following the recommendations below.

If the owner elects to place new structural fills above the alluvial soils, the following

protocol should be followed. Once the existing vegetation and root mat has been removed, the area should be underlain with a geotextile (Mirafi 500X, or equivalent). The geotextile should be overlain by at least 12-inches of compacted ABC stone to act as a bridge lift. Structural fill soils should then be placed and compacted over the ABC stone until finished grades are achieved.

## Excavation

The residual and fill soils encountered at the boring locations may be excavated with conventional construction equipment such as bulldozers, backhoes, and trackhoes. Hard residual soils and PWR were encountered in several borings (B-104, B-112, B-03, B-04, and B-05) at relatively shallow depths (8 to 15 feet) and may be encountered at similar depths in other areas across the site. Relatively deep excavations, such as for underground utility installation, may encounter hard excavation and potential weathered rock/competent rock that may require blasting or hammering to remove efficiently. Smaller equipment may have difficulty excavating PWR. A large trackhoe or bulldozer equipped with a single-tooth ripper maybe required to excavate these materials. Some PWR, especially in confined excavations, will require blasting or impact hammering to efficiently excavate. We recommend that unit rates for mass rock and trench rock be included in the bid package to limit disputes in the event that rock-like materials are encountered.

The descriptions provided below are a guide to conditions generally encountered in the region of the project site. Required excavation techniques will vary based on weathering of the materials to be excavated, and the fracturing, jointing and overall stratigraphy of the feature. Actual field conditions usually display a gradual weathering progression with poorly defined and uneven boundaries between layers of different materials. We recommend that the following definitions for rock in earthwork excavation and drilled-pier construction be included in bid documents:

Excavation Type	Definition
Mass Excavation (mass rock)	Any material occupying an original volume of more than 1 cubic yard which cannot be excavated with a single-toothed ripper drawn by a crawler tractor having a minimum draw bar pull rating of not less than 80,000 pounds usable pull (Caterpillar D-8 or larger).
Trench Excavation (trench rock)	Any material occupying an original volume of more than 1/2 cubic yard which cannot be excavated with a backhoe having a bucket curling rate of not less than 40,000 pounds, using a rock bucket and rock teeth (Caterpillar 325 or larger).



Excavation Type	Definition
Drilled Pier Excavation	Any natural hard and dense undisturbed subsurface material which cannot be removed with an earth auger or under-reaming tool, or for which the penetration rate is less than 2 inches per 5 minutes of drilling at full crowd force (with a rock auger or core barrel with hard formation drilling bit).

## Soil Stabilization

Methods of subgrade improvement, as described below, could include scarification, moisture conditioning and recompaction, removal of unstable materials and replacement with granular fill (with or without geosynthetics), and chemical stabilization. The appropriate method of improvement, if required, would be dependent on factors such as schedule, weather, the size of area to be stabilized, and the nature of the instability. More detailed recommendations can be provided during construction as the need for subgrade stabilization occurs. Performing site grading operations during warm seasons and dry periods would help reduce the amount of subgrade stabilization required.

If the exposed subgrade is unstable during proofrolling operations, it could be stabilized using one of the methods outlined below.

- **Scarification and Recompaction** - It may be feasible to scarify, dry, and recompact the exposed soils. The success of this procedure would depend primarily upon favorable weather and sufficient time to dry the soils. Stable subgrades likely would not be achievable if the thickness of the unstable soil is greater than about 1 foot, if the unstable soil is at or near groundwater levels, or if construction is performed during a period of wet or cool weather when drying is difficult.
- **Crushed Stone** - The use of crushed stone or crushed gravel is a common procedure to improve subgrade stability. Typical undercut depths would be expected to range from about 12 to 24 inches below finished subgrade elevation. The use of high modulus geotextiles (i.e., engineering fabric or geogrid) could also be considered after underground work such as utility construction is completed. Prior to placing the fabric or geogrid, we recommend that all below grade construction, such as utility line installation, be completed to avoid damaging the fabric or geogrid. Equipment should not be operated above the fabric or geogrid until one full lift of crushed stone fill is placed above it. The maximum particle size of granular material placed over geotextile fabric or geogrid should not exceed 1-1/2 inches.
- **Chemical Modification** - Improvement of subgrades with portland cement or class C fly ash could be considered for improving unstable soils. Chemical modification should be performed by a pre-qualified contractor having experience with successfully stabilizing subgrades in the project area on similar sized

projects with similar soil conditions. Results of chemical analysis of the additive materials should be provided to the geotechnical engineer prior to use. The hazards of chemicals blowing across the site or onto adjacent property should also be considered. Additional testing would be needed to develop specific recommendations to improve subgrade stability by blending chemicals with the site soils. Additional testing could include, but not be limited to, determining the most suitable stabilizing agent, the optimum amounts required, the presence of sulfates in the soil, and freeze-thaw durability of the subgrade.

## Fill Material Types

Earthen materials used for structural fill should meet the following material property requirements.

Soil Type <sup>1</sup>	USCS Classification	Acceptable Location for Placement
Imported Low Plasticity Soils	ML, CL, SC, SM (LL < 50 & PI < 20 with a minimum 15% passing No. 200 sieve)	All locations and elevations.
On-Site Low Plasticity Soils	ML, CL, SM, SC (LL < 50 & PI < 30)	All locations and elevations.
On-Site High Plasticity Soils	CH, MH (LL ≥ 50 or PI ≥ 30)	Non-structural areas and greater than 3 feet below pavements.
GeoModel Layer Expected to be Suitable <sup>2</sup>	2, 4, 5	All locations and elevations.

1. Structural fill should consist of approved materials free of organic matter and debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.
2. Based on subsurface exploration. Actual material suitability should be determined in the field at time of construction.

## Fill Placement and Compaction Requirements

Structural fill should meet the following compaction requirements.



Item	Structural Fill
<b>Maximum Lift Thickness</b>	8 inches or less in loose thickness when heavy, self-propelled compaction equipment is used 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used
<b>Minimum Compaction Requirements</b> <sup>1,2,3</sup>	Minimum 95% of the material’s maximum standard Proctor dry density (ASTM D 698). The upper 12 inches of subgrade in pavement areas should be compacted to at least 100% of the materials maximum standard Proctor dry density (ASTM D 698).
<b>Water Content Range</b> <sup>1</sup>	Within 3% of optimum moisture content

1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).
2. High plasticity cohesive fill should not be compacted to more than 100% of standard Proctor maximum dry density.
3. If the granular material is a coarse sand or gravel, or of a uniform size, or has a low fines content, compaction comparison to relative density may be more appropriate. In this case, granular materials should be compacted to at least 70% relative density (ASTM D 4253 and D 4254). Materials not amenable to density testing should be placed and compacted to a stable condition observed by the Geotechnical Engineer or representative.

### Utility Trench Backfill

Any soft or unsuitable materials encountered at the bottom of utility trench excavations should be removed and replaced with structural fill or bedding material in accordance with public works specifications for the utility to be supported. This recommendation is particularly applicable to utility work requiring grade control and/or in areas where subsequent grade raising could cause settlement in the subgrade supporting the utility. Trench excavation should not be conducted below a downward 1:1 projection from existing foundations without engineering review of shoring requirements and geotechnical observation during construction.

On-site materials are considered suitable for backfill of utility and pipe trenches from 1 foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs or footings, the

backfill should satisfy the gradation and expansion index requirements of structural fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

For low permeability subgrades, utility trenches are a common source of water infiltration and migration. Utility trenches penetrating beneath the building should be effectively sealed to restrict water intrusion and flow through the trenches, which could migrate below the building. The trench should provide an effective trench plug that extends at least 5 feet from the face of the building exterior. The plug material should consist of cementitious flowable fill or low permeability clay. The trench plug material should be placed to surround the utility line. If used, the clay trench plug material should be placed and compacted to comply with the water content and compaction recommendations for structural fill stated previously in this report.

## Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure, a maintenance program should be established to effectively seal and maintain joints and prevent surface water infiltration.

## Earthwork Construction Considerations

Shallow excavations for the proposed structure are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-supported improvements such as floor slabs and pavements. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes,

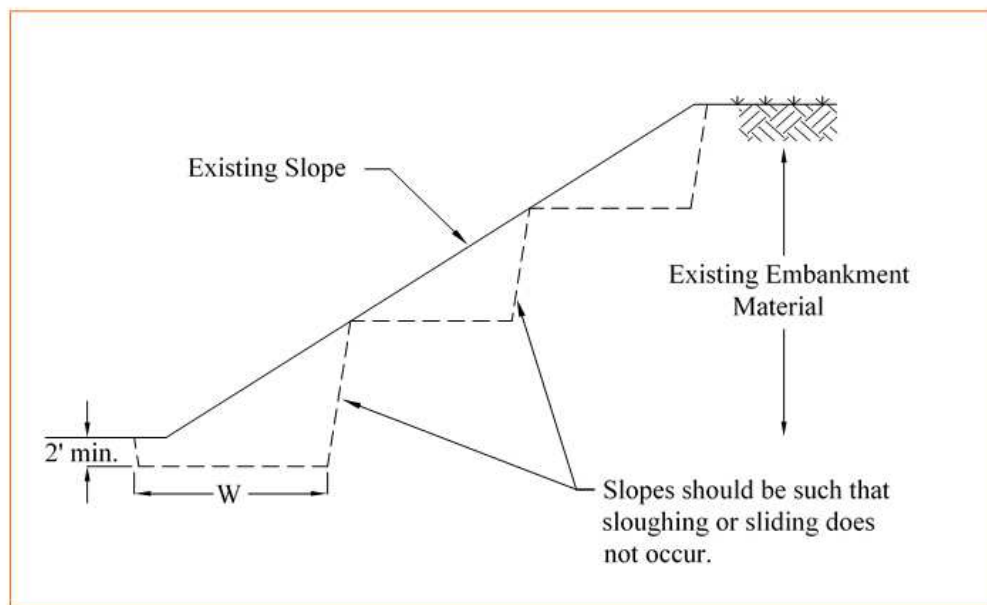
desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompactd prior to floor slab construction.

We recommend that permanent cut slopes less than 20 feet tall in undisturbed residual soils be constructed at 2.5:1 (horizontal: vertical) or flatter. Permanent fill slopes less than 20 feet tall may be constructed using controlled fill at a slope of 3:1 or flatter. The surface of all cut and fill slopes should be adequately compacted. All permanent slopes should be protected using vegetation or other means to prevent erosion.

If steeper slopes are required for site development, stability analyses should be completed. The face of all slopes should be compacted to the minimum specification for fill embankments. Alternately, fill slopes can be overbuilt and trimmed to compacted material.

The new fill at the site should be placed using proper benching techniques to tie the new fill into the existing slopes. Each bench should be keyed into the existing slope a minimum of 4 feet wide. The base of the key should be graded horizontal, or inclined slightly into the existing embankment slope. The outside of the bottom key should be below any existing fill and loose soils to a depth of at least two (2) feet. This benching recommendation is presented in the following sketch.

**Typical Benching Detail**



NOTE: The Key width "W" should be a minimum of 4 feet wide

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety or the contractor's activities; such responsibility shall neither be implied nor inferred.

Excavations or other activities resulting in ground disturbance have the potential to affect adjoining properties and structures. Our scope of services does not include review of available final grading information or consider potential temporary grading performed by the contractor for potential effects such as ground movement beyond the project limits. A preconstruction/ precondition survey should be conducted to document nearby property/infrastructure prior to any site development activity. Excavation or ground disturbance activities adjacent or near property lines should be monitored or instrumented for potential ground movements that could negatively affect adjoining property and/or structures.

## Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and pavements), evaluation and remediation of existing fill materials, as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be adequately tested for density and water content at a frequency under the direction of the Geotechnical Engineer.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. If unanticipated conditions are observed, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

## Shallow Foundations

If the site has been prepared in accordance with the requirements noted in **Earthwork**, the following design parameters are applicable for shallow foundations.

## Design Parameters – Compressive Loads

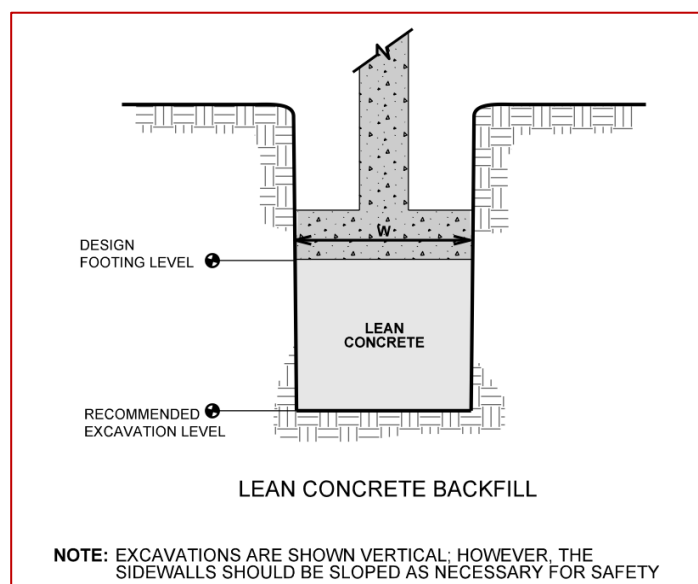
Item	Description
<b>Maximum Net Allowable Bearing Pressure</b> <sup>1, 2</sup>	2,500 psf - foundations bearing upon approved existing soils or new structural fill
<b>Required Bearing Stratum</b> <sup>3</sup>	GeoModel Layer 4 or 5 or approved fill soil
<b>Minimum Foundation Dimensions</b>	Columns: 30 inches Continuous: 18 inches
<b>Ultimate Passive Resistance</b> <sup>4</sup> <b>(equivalent fluid pressures)</b>	307 pcf (cohesive backfill) 391 pcf (granular backfill)
<b>Sliding Resistance</b> <sup>5</sup>	120 psf allowable cohesion (native/structural fill clay) 0.35 allowable coefficient of friction - granular material
<b>Minimum Embedment below Finished Grade</b> <sup>6</sup>	Exterior footings: 18 inches Interior footings in heated areas: 12 inches
<b>Estimated Total Settlement from Structural Loads</b> <sup>2</sup>	Less than about 1 inch
<b>Estimated Differential Settlement</b> <sup>2, 7</sup>	About 2/3 of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. Values assume that exterior grades are no steeper than 20% within 10 feet of structure.
2. Values provided are for maximum loads noted in [Project Description](#). Additional geotechnical consultation will be necessary if higher loads are anticipated.
3. Unsuitable or soft soils should be overexcavated and replaced per the recommendations presented in [Earthwork](#).
4. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed and compacted structural fill be placed against the vertical footing face. Assumes no hydrostatic pressure.
5. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Frictional resistance for granular materials is dependent on the bearing pressure which may vary due to load combinations. For fine-grained materials, lateral resistance using cohesion should not exceed 1/2 the dead load.
6. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
7. Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet.

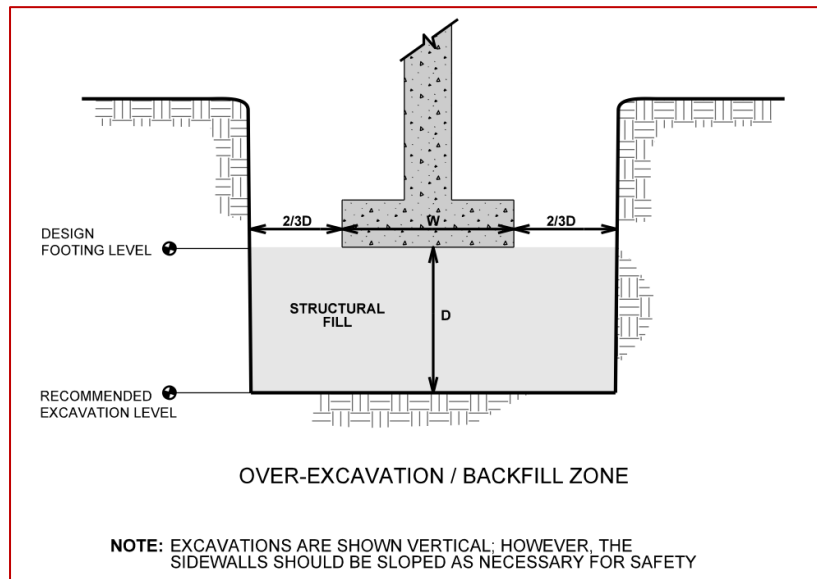
## Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be evaluated under the observation of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

If unsuitable bearing soils are observed at the base of the planned footing excavation, the excavation should be extended deeper to suitable soils, and the footings could bear directly on these soils at the lower level or on lean concrete backfill placed in the excavations. The lean concrete replacement zone is illustrated on the following sketch.



Overexcavation for structural fill placement below footings should be conducted as shown on the following sketch. The overexcavation should be backfilled up to the footing base elevation, with structural fill placed, as recommended in the **Earthwork** section.



## Floor Slabs

Design parameters for floor slabs assume the requirements for **Earthwork** have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Existing fill materials and materials described as possible fill were observed at the site to depths of B-104, B-108, B-03 and B-04 to depths of 3 to 5.5 feet below existing grade. As previously described, any existing fill present beneath floor slabs should be completely removed OR further evaluated by the Geotechnical Engineer.

### Floor Slab Design Parameters

Item	Description
<b>Floor Slab Support<sup>1</sup></b>	Suitable existing soils or new structural fill compacted in accordance with <b>Earthwork</b> section of this report. <sup>1</sup>
<b>Estimated Modulus of Subgrade Reaction <sup>2</sup></b>	100 pounds per square inch per inch (psi/in) for point loads
<b>Aggregate base course/capillary break <sup>3</sup></b>	Minimum 4 inches of free-draining granular material (less than 5% passing the U.S. No. 200 sieve)

1. Floor slabs should be structurally independent of building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation.



Item	Description
	<ol style="list-style-type: none"> <li>2. Modulus of subgrade reaction is an estimated value based upon our experience with the subgrade condition, the requirements noted in <b>Earthwork</b>, and the floor slab support as noted in this table. It is provided for point loads. For large area loads the modulus of subgrade reaction would be lower.</li> <li>3. Free-draining granular material should have less than 5% fines (material passing the No. 200 sieve). Other design considerations such as cold temperatures and condensation development could warrant more extensive design provisions.</li> </ol>

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut contraction joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations, refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Settlement of floor slabs supported on existing fill materials cannot be accurately predicted but could be larger than normal and result in some cracking. Mitigation measures, as noted in **Existing Fill** within **Earthwork**, are critical to the performance of floor slabs. In addition to the mitigation measures, the floor slab can be stiffened by adding steel reinforcement, grade beams, and/or post-tensioned elements.

### Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and structural fill should be added to replace the resulting excavation. Final conditioning



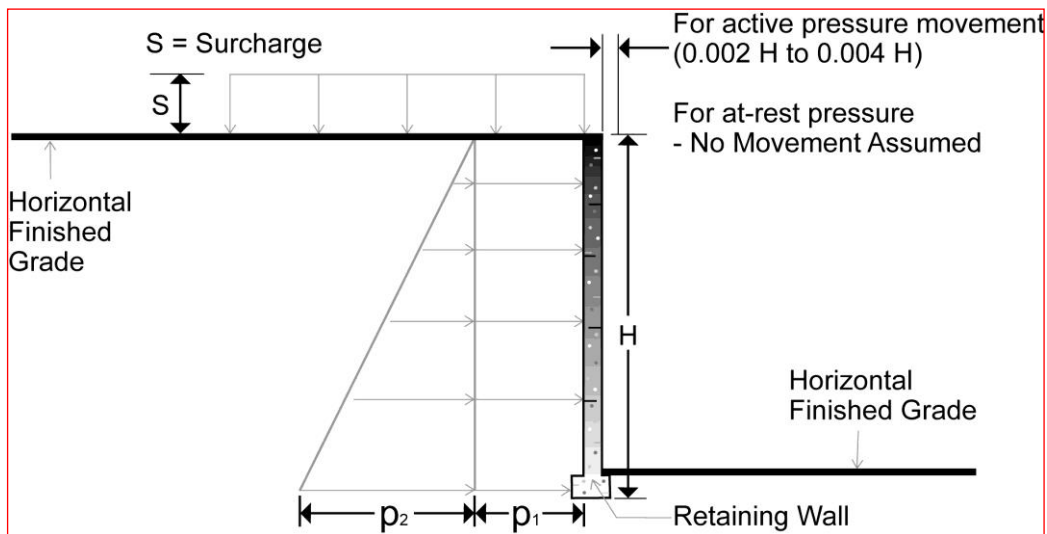
of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

## Lateral Earth Pressures

### Design Parameters

Structures with unbalanced backfill levels on opposite sides should be designed for earth pressures at least equal to values indicated in the following table. Earth pressures will be influenced by structural design of the walls, conditions of wall restraint, methods of construction, and/or compaction and the strength of the materials being restrained. Two wall restraint conditions are shown in the diagram below. Active earth pressure is commonly used for design of free-standing cantilever retaining walls and assumes wall movement. The "at-rest" condition assumes no wall movement and is commonly used for basement walls, loading dock walls, or other walls restrained at the top. The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls (unless stated).



### Lateral Earth Pressure Design Parameters

Earth Pressure Condition <sup>1</sup>	Coefficient for Backfill Type <sup>2</sup>	Surcharge Pressure <sup>3</sup> p <sub>1</sub> (psf)	Equivalent Fluid Pressures p <sub>2</sub> (psf) <sup>2,4</sup>	
			Unsaturated <sup>5</sup>	Submerged <sup>5</sup>
Active (K <sub>a</sub> )	Granular - 0.31	(0.31)S	(37)H	(80)H
	Fine Grained - 0.39	(0.39)S	(47)H	(85)H
At-Rest (K <sub>o</sub> )	Granular - 0.47	(0.47)S	(56)H	(90)H
	Fine Grained - 0.56	(0.56)S	(67)H	(95)H

1. For active earth pressure, wall must rotate about base, with top lateral movements 0.002 H to 0.004 H, where H is wall height. For passive earth pressure, wall must move horizontally to mobilize resistance. Fat clay or other expansive soils should not be used as backfill behind the wall.
2. Uniform, horizontal backfill, with a maximum unit weight of 120 pcf.
3. Uniform surcharge, where S is surcharge pressure.
4. Loading from heavy compaction equipment is not included.
5. To achieve "Unsaturated" conditions, follow guidelines in **Subsurface Drainage for Below-Grade Walls** below. "Submerged" conditions are recommended when drainage behind walls is not incorporated into the design.

Backfill placed against structures should consist of granular soils or low plasticity cohesive soils. For the granular values to be valid, the granular backfill must extend out and up from the base of the wall at an angle of at least 45 degrees from vertical for the active case.

Footings, floor slabs or other loads bearing on backfill behind walls may have a significant influence on the lateral earth pressure. Placing footings within wall backfill and in the zone of active soil influence on the wall should be avoided unless structural analyses indicate the wall can safely withstand the increased pressure.

The lateral earth pressure recommendations given in this section are applicable to the design of rigid retaining walls subject to slight rotation, such as cantilever, or gravity type concrete walls. These recommendations are not applicable to the design of modular block - geogrid reinforced backfill walls (also termed MSE walls). Recommendations covering these types of wall systems are beyond the scope of services for this assignment. However, we would be pleased to develop a proposal for evaluation and design of such wall systems upon request.

## **Mechanically Stabilized (MSE) Retaining Walls**

Based on the provided plans, fill retaining walls are proposed in the vicinity of the splash pad, in the western portion of the site. Wall types were not provided, but we anticipate the fill wall will likely be MSE walls. The following design recommendations are based on the results of our field exploration and laboratory testing and our experience with soils in the vicinity of the project.

MSE retaining walls typically consist of some form of modular concrete block face units, reinforcing material, such as geogrids, attached to selected layers of the face units, and on-site soils or imported select granular material compacted over the reinforcing material to create a reinforced soil mass that acts as a large gravity-type retaining wall. The design of the MSE retaining wall will need to consider the following geotechnical parameters in designing the wall: 1) the unit weight and strength parameters of the in-place native materials acting against the reinforced compacted soil mass; 2) the unit weight and soil strength parameters of the compacted soil that will form the reinforced zone of the MSE wall; and, 3) the unit weight and strength parameters of the foundation subgrade on which the MSE wall is constructed.

As previously discussed, up to 12 feet of new fill is expected along the retaining wall. MSE walls are relatively flexible structures and can withstand reasonable differential settlements. The retaining wall designer should take anticipated settlements into consideration during their design.

Parameters used in the MSE retaining wall design and global stability analysis should not exceed those given in the values presented in the following table. The retaining wall design and global stability analyses should also consider surcharge loading from the proposed structures.

The soil parameters presented in the table are based on the subsurface conditions encountered at the boring locations, estimated shear strength values, locally available materials, and our experience with similar materials.

The following recommendations are applicable for foundation soils under MSE retaining walls.

### Recommended Strength Parameters for Foundation Subgrade Material

Material Type	Total Unit Weight (pcf)	Total Stress (Undrained) Parameters		Effective Stress (Drained) Parameters	
		$c_u$ , psf	$\Phi$ , degrees	$c_u$ , psf	$\Phi$ , degrees
In-situ, fine-grained soils	110	300	15	100	28
In-situ granular soils or newly compacted structural fill <sup>1</sup>	120	100	18	0	30
Partially Weathered Rock	135	--	--	100	45

1. Structural fill should be placed as described in the [Earthwork](#) section.

The following recommendations are applicable for fill soils behind the reinforced zone of the MSE retaining walls.

### Recommended Strength Parameters for Backfill Materials behind MSE Reinforced Zone

Material Type <sup>1</sup>	Total Unit Weight (pcf)	Total Stress (Undrained) Parameters		Effective Stress (Drained) Parameters	
		$c_u$ , psf	$\Phi$ , degrees	$c_u$ , psf	$\Phi$ , degrees
On-site fine-grained soils recompacted as structural fill	110	300	15	100	28
On-site granular soils recompacted as structural fill	120	100	18	0	30
Imported granular, structural fill with < 35% passing the No. 200 sieve	120	0	30	0	32

1. Structural fill should be placed as described in the [Earthwork](#) section.

Care should be taken in design and during construction to develop and maintain rapid, positive drainage away from the retaining wall areas. Water should not be allowed to pond adjacent to the upslope or downslope sides of retaining walls. We recommend that drainage swales with sufficient gradients be constructed along the upslope and downslope sides of the walls to direct surface water away from the wall. Proper surface drainage is needed to prevent water from flowing over the face of the walls and

saturating the fill behind the walls or the subgrade soils at the base of the walls. Proper drainage should also be provided to prevent water from collecting behind the walls.

Prior to starting construction of MSE walls, fill material proposed to be used in constructing the reinforced zone for the wall should be sampled and tested in the laboratory to confirm that the engineering properties of the backfill satisfy the assumed properties used in design. Observation and field testing during construction of the MSE wall by qualified geotechnical personnel is also recommended.

## Pavements

### General Pavement Comments

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in **Project Description** and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the **Earthwork** section.

Support characteristics of subgrade for pavement design do not account for shrink/swell movements of an expansive clay subgrade, such as soils observed on this project. Thus, the pavement may be adequate from a structural standpoint, yet still experience cracking and deformation due to shrink/swell related movement of the subgrade.

### Pavement Design Parameters

A California Bearing Ratio (CBR) of 3 was used for the subgrade for the asphaltic concrete (AC) pavement designs. A modulus of subgrade reaction of 100 pci was used for the portland cement concrete (PCC) pavement designs. The value was empirically derived based upon our experience with the Piedmont subgrade soils and our expectation of the quality of the subgrade as prescribed by the **Site Preparation** conditions as outlined in **Earthwork**. A modulus of rupture of 580 psi was used in design for the concrete (based on correlations with a minimum 28-day compressive strength of 4,000 psi).

### Pavement Section Thicknesses

The following table provides our opinion of minimum thickness for AC sections:

### Asphaltic Concrete Design

Layer	NCDOT Grading <sup>1</sup>	Recommended Minimum Thickness (inches)	
		Traffic Class 1 <sup>2</sup>	Traffic Class 2 <sup>2</sup>
Asphalt Concrete Surface Course	S-9.5B	3 <sup>3</sup>	1.5
Asphalt Concrete Intermediate Course	I-19.0C	--	2
Aggregate Base	ABC	6	8

1. All materials should meet the current North Carolina Department of Transportation (NCDOT) Standard Specifications.
2. See [Project Description](#) for more specifics regarding traffic assumptions.
3. Placed in two equal lifts.

The following table provides our estimated minimum thickness of PCC pavements.

### Portland Cement Concrete Design

Layer	Specification <sup>1</sup>	Recommended Minimum Thickness (inches) <sup>2</sup>		
		Traffic Category A <sup>2</sup>	Traffic Category B <sup>2</sup>	Traffic Category E <sup>2,3</sup>
Portland Cement Concrete	4,000 psi	5	5	8
Aggregate Base	ABC	--	--	4

1. All materials should meet the current North Carolina Department of Transportation (NCDOT) Standard Specifications.
2. See [Project Description](#) for more specifics regarding traffic assumptions.
3. In areas of anticipated heavy traffic, fire trucks, delivery trucks, or concentrated loads (e.g. dumpster pads), and areas with repeated turning or maneuvering of heavy vehicles.

The minimum pavement sections outlined above was recommended based on assumed post-construction traffic loading conditions for this type of development. This pavement section does not account for heavy construction traffic during construction. A partially constructed structural section that is subjected to heavy construction traffic can result in pavement deterioration and premature failure. Our experience indicates that this pavement construction practice can result in pavements that will not perform as intended. Considering this information, several alternatives are available to mitigate the impact of heavy construction traffic on the pavement

construction. These include using thicker sections to account for the construction traffic, using some method of soil stabilization to improve the support characteristics of the pavement subgrade, or by routing heavy construction traffic around paved streets.

Rigid PCC pavements will perform better than ACC in areas where short-radii turning and braking are expected (i.e., entrance/exit aprons) due to better resistance to rutting and shoving. In addition, PCC pavement will perform better in areas subject to large or sustained loads. An adequate number of longitudinal and transverse control joints should be placed in the rigid pavement in accordance with ACI requirements. Expansion (isolation) joints must be full depth and should only be used to isolate fixed objects abutting or within the paved area.

Areas for parking of heavy vehicles, concentrated turn areas, and start/stop maneuvers could require thicker pavement sections. Edge restraints (i.e. concrete curbs or aggregate shoulders) should be planned along curves and areas of maneuvering vehicles.

Although not required for structural support, a minimum 4-inch thick base course layer is recommended to help reduce potential for slab curl, shrinkage cracking, and subgrade pumping through joints. Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign material and doweled where necessary for load transfer. PCC pavement details for joint spacing, joint reinforcement, and joint sealing should be prepared in accordance with ACI 330 and ACI 325.

Where practical, we recommend early-entry cutting of crack-control joints in PCC pavements. Cutting of the concrete in its "green" state typically reduces the potential for micro-cracking of the pavements prior to the crack control joints being formed, compared to cutting the joints after the concrete has fully set. Micro-cracking of pavements may lead to crack formation in locations other than the sawed joints, and/or reduction of fatigue life of the pavement.

Openings in pavements, such as decorative landscaped areas, are sources for water infiltration into surrounding pavement systems. Water can collect in the islands and migrate into the surrounding subgrade soils thereby degrading support of the pavement. Islands with raised concrete curbs, irrigated foliage, and low permeability near-surface soils are particular areas of concern. The civil design for the pavements with these conditions should include features to restrict or collect and discharge excess water from the islands. Examples of features are edge drains connected to the stormwater collection system, longitudinal subdrains, or other suitable outlets and impermeable barriers preventing lateral migration of water such as a cutoff wall installed to a depth below the pavement structure.

## Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic upkeep should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.
- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

## General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.



Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

## Geotechnical Engineering Report

Northwest Community Park | Concord, North Carolina  
November 23, 2022 | Terracon Project No. 71225209

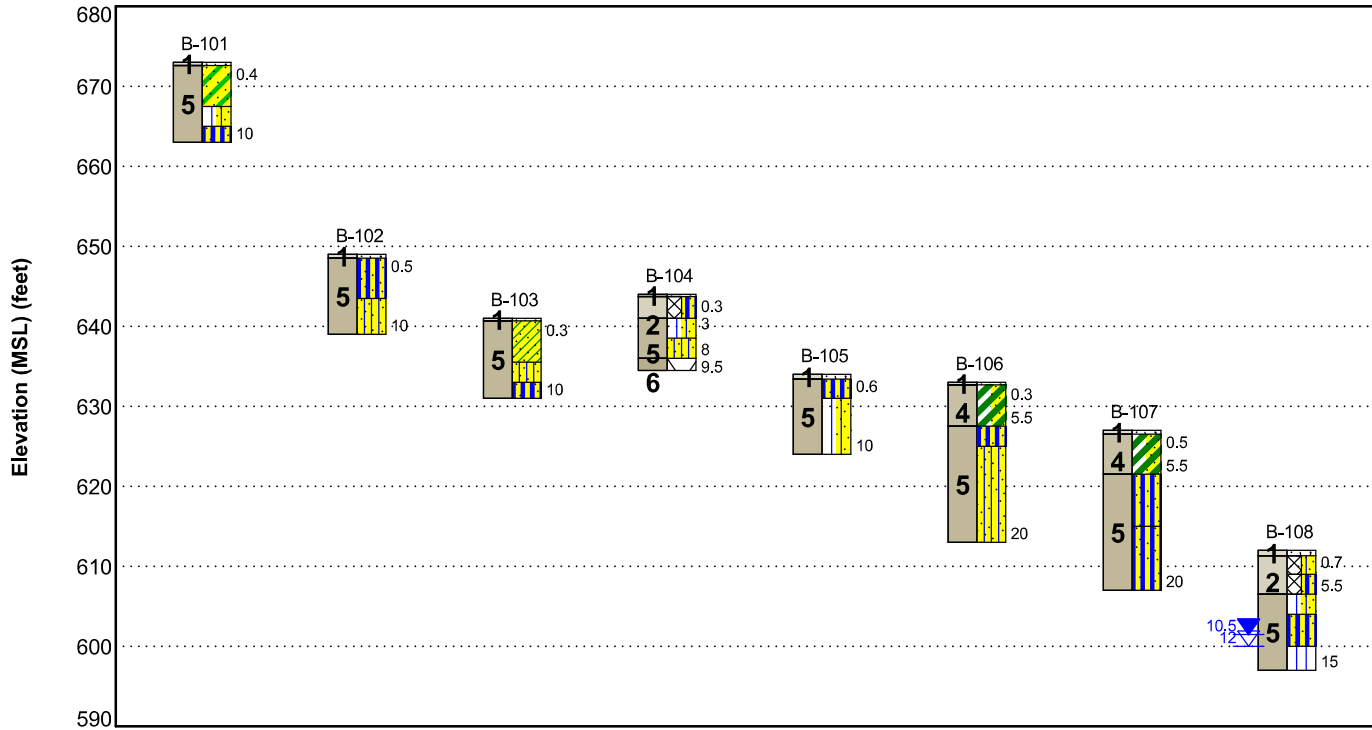


# Figures

## Contents:

GeoModel (2 pages)

## GeoModel



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

### LEGEND

Model Layer	Layer Name	General Description
1	<b>Surficial Materials</b>	Topsoil, Gravel
2	<b>Fill</b>	SILT with varying amounts of sand, sandy LEAN CLAY, clayey SAND
3	<b>Alluvial Soil</b>	Silty SAND, LEAN CLAY with varying amounts of sand
4	<b>High Plasticity Residual Soil</b>	FAT CLAY with varying amounts of sand, sandy ELASTIC SILT
5	<b>Low Plasticity Residual Soil</b>	Clayey SAND, silty SAND, SILT with varying amounts of sand, LEAN CLAY with varying amounts of sand
6	<b>Partially Weathered Rock (PWR)</b>	Sampled as silty SAND

	Topsoil		Clayey Sand
	Silt with Sand		Sandy Silt
	Silty Sand		Sandy Lean Clay
	Weathered Rock		Fat Clay with Sand
	Silt		

**NOTES:**

Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project.

- First Water Observation
- Second Water Observation
- Third Water Observation

The groundwater levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.



**Geotechnical Engineering Report**

Northwest Community Park | Concord, North Carolina

November 23, 2022 | Terracon Project No. 71225209



## Attachments

# Exploration and Testing Procedures

## Field Exploration

Number of Borings	Approximate Boring Depth (feet) <sup>1</sup>	Location <sup>2</sup>
13	9.5 to 20	Buildings/Roads/Retaining Walls/Paths
2	20 to 35	Stockpile / Wet-well
1	2.5	Future underground storm detention

1. Below existing grades.
2. See [Exploration Plan](#) for approximate locations.

**Boring Layout and Elevations:** Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ±10 feet) and referencing existing site features. Approximate ground surface elevations were obtained by interpolation from the provided topographic site plan. If elevations and a more precise boring layout are desired, we recommend borings be surveyed.

**Subsurface Exploration Procedures:** We advanced the borings with an ATV-mounted rotary drill rig using continuous hollow stem flight augers. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the thin-walled tube sampling procedure, a thin-walled, seamless steel tube with a sharp cutting edge was pushed hydraulically into the soil to obtain a relatively undisturbed sample. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

We also observed the boreholes while drilling and at the completion of drilling for the presence of groundwater. The groundwater levels are shown on the attached boring logs.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field

logs included visual classifications of the materials observed during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

## Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- Moisture Content
- Atterberg Limits
- Wash 200
- Hydraulic Conductivity of Saturated Soils

The laboratory testing program often included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.



## Photography Log



Typical view throughout property



Structure within property (B-106)



Fenced area behind structure (B-106)



Stockpile (B-114 & B-115)



## Site Location and Exploration Plans

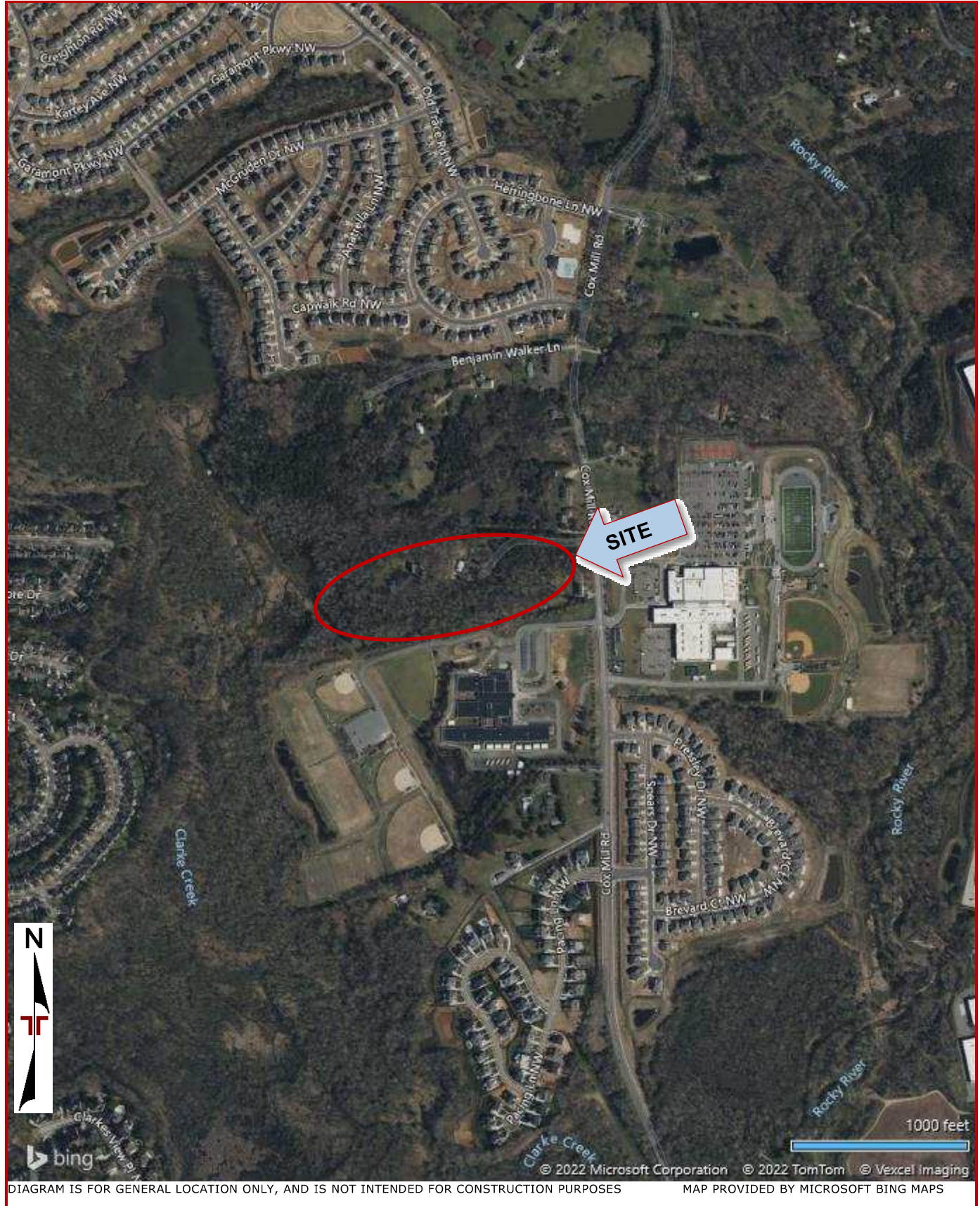
### **Contents:**

Site Location

Exploration Plan

Note: All attachments are one page unless noted above.

## Site Location





## Exploration Plan

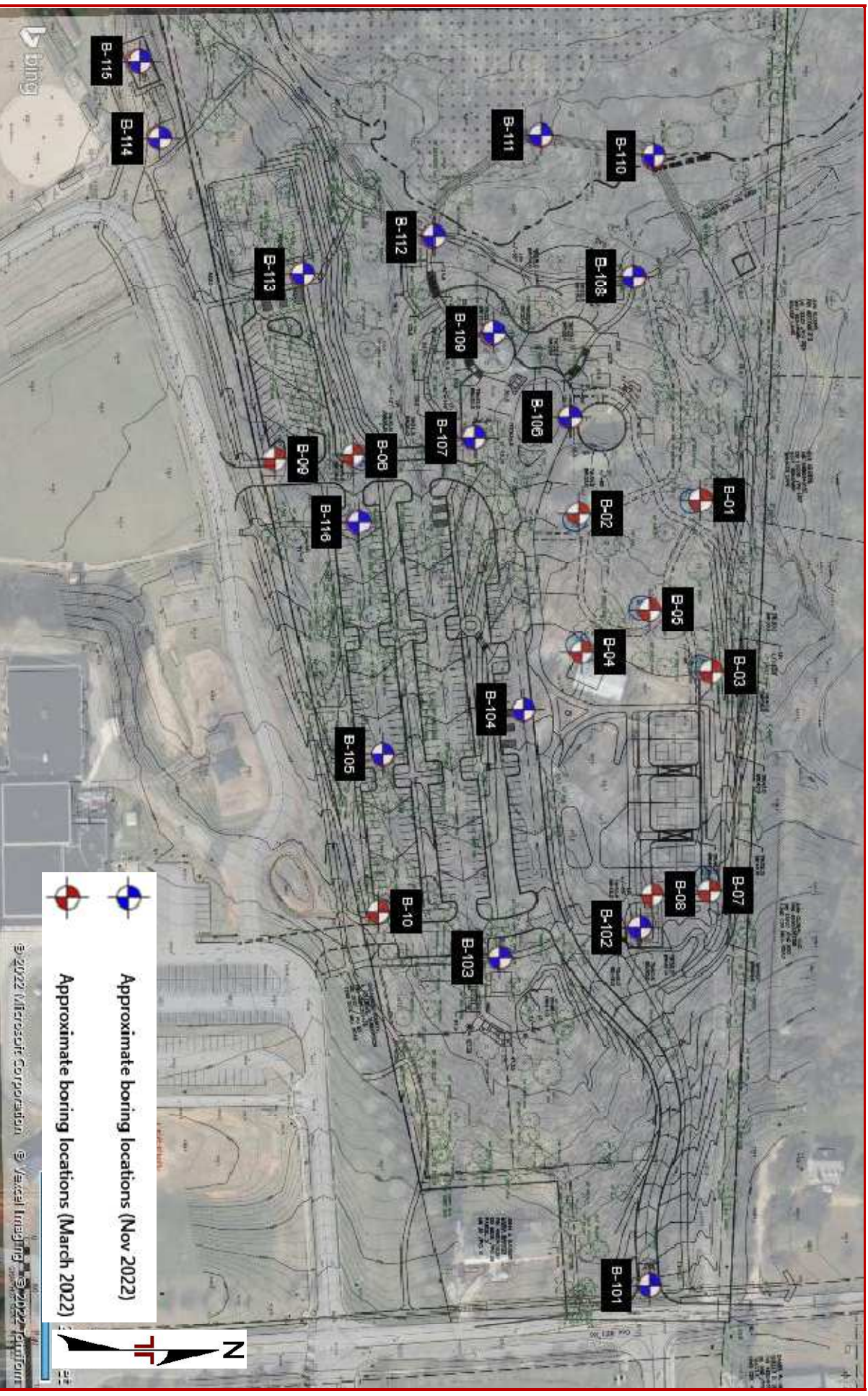


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS; OVERLAY PROVIDED BY CLIENT

## **Exploration and Laboratory Results**

### **Contents:**

Boring Logs (B-101 through B-116) (17 pages)  
Summary of Laboratory Results  
Atterberg Limits  
Hydraulic Conductivity of Saturated Porous Materials

Note: All attachments are one page unless noted above.

## Boring Log No. B-101

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3960° Longitude: -80.7306° Depth (Ft.) Elevation: 673 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
								LL-PL-PI	Percent Fines
1		<b>TOPSOIL</b> , 5-inches	0.4						
5		<b>CLAYEY SAND (SC)</b> , fine to coarse grained, dark brown, loose, residual	5.5			3-3-4 N=7	14.2	34-18-16	40
		Gray, yellowish brown, and grayish brown							
		<b>SILT WITH SAND (ML)</b> , trace manganese, reddish brown, yellowish brown, and grayish brown, hard	8.0			2-4-6 N=10			
		<b>SANDY SILT (ML)</b> , yellowish brown and reddish brown, very stiff	10.0			6-13-18 N=31			
		<b>Boring Terminated at 10 Feet</b>	10			6-9-11 N=20			

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).                  See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p> <p><b>Notes</b>                  Elevation Reference: Elevations were interpolated from a topographic site plan.</p>	<p><b>Water Level Observations</b>                  No free water observed</p> <p> Dry Cave-In</p> <p><b>Advancement Method</b>                  Hollow Stem Auger</p> <p><b>Abandonment Method</b>                  Boring backfilled with auger cuttings upon completion.</p>	<p><b>Drill Rig</b>                  CME 550X</p> <p><b>Hammer Type</b>                  Automatic</p> <p><b>Driller</b>                  J. Cain</p> <p><b>Logged by</b>                  S. Bledsoe</p> <p><b>Boring Started</b>                  10-25-2022</p> <p><b>Boring Completed</b>                  10-25-2022</p>
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## Boring Log No. B-102

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3959° Longitude: -80.7321°	Depth (Ft.)	Elevation: 649 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits		
									LL-PL-PI	Percent Fines	
1		0.5 <b>TOPSOIL</b> , 6-inches	0.5	648.5							
5		<b>SANDY SILT (ML)</b> , yellowish brown and light brown, hard, residual					5-10-20 N=30				
		Gray, light brown, and white			5		25-26-33 N=59				
		5.5 <b>SILTY SAND (SM)</b> , fine to coarse grained, gray, brown, and white, very dense		5.5	643.5			23-31-43 N=74			
		With black					13-31-37 N=68				
		10.0 <b>Boring Terminated at 10 Feet</b>	10.0	639							

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).</p> <p>See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p>	<p><b>Water Level Observations</b> No free water observed</p>
<p><b>Notes</b> Elevation Reference: Elevations were interpolated from a topographic site plan.</p>	<p> Dry Cave-In</p> <p><b>Advancement Method</b> Hollow Stem Auger</p> <p><b>Abandonment Method</b> Boring backfilled with auger cuttings upon completion.</p>
	<p><b>Drill Rig</b> CME 550X</p> <p><b>Hammer Type</b> Automatic</p> <p><b>Driller</b> J. Cain</p> <p><b>Logged by</b> M. Bovenzi</p> <p><b>Boring Started</b> 10-25-2022</p> <p><b>Boring Completed</b> 10-25-2022</p>

## Boring Log No. B-103

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3955° Longitude: -80.7319°	Depth (Ft.)	Elevation: 641 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
									LL-PL-PI	Percent Fines
1		0.3	0.3	640.7						
		<b>TOPSOIL</b> , 4-inches <b>SANDY LEAN CLAY (CL)</b> , brown, trace light brown, very stiff, residual					4-7-10 N=17	12.2	39-19-20	55
5		5.5 With white, with manganese <b>SILTY SAND (SM)</b> , fine to coarse grained, yellowish brown and gray, medium dense	5.5	635.5			10-12-8 N=20			
		8.0 <b>SANDY SILT (ML)</b> , gray, white, and yellowish brown, very stiff	8.0	633			6-7-7 N=14			
		10.0 <b>Boring Terminated at 10 Feet</b>	10.0	631			6-9-10 N=19			

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).                  See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p> <p><b>Notes</b>                  Elevation Reference: Elevations were interpolated from a topographic site plan.</p>	<p><b>Water Level Observations</b>                  No free water observed</p> <p> Dry Cave-In</p> <p><b>Advancement Method</b>                  Hollow Stem Auger</p> <p><b>Abandonment Method</b>                  Boring backfilled with auger cuttings upon completion.</p>	<p><b>Drill Rig</b>                  CME 550X</p> <p><b>Hammer Type</b>                  Automatic</p> <p><b>Driller</b>                  J. Cain</p> <p><b>Logged by</b>                  M. Bovenzi</p> <p><b>Boring Started</b>                  10-25-2022</p> <p><b>Boring Completed</b>                  10-25-2022</p>
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## Boring Log No. B-104

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3955° Longitude: -80.7329°	Depth (Ft.)	Elevation: 644 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
									LL-PL-PI	Percent Fines
1		<b>TOPSOIL AND GRAVEL</b> , 4-inches	0.3	643.7						
2		<b>FILL - SANDY SILT (ML)</b> , gray, reddish brown, and brown, hard	3.0	641			7-23-33 N=56			
5		<b>SILT WITH SAND (ML)</b> , trace manganese, grayish brown and brown, trace reddish brown, hard, residual	5.5	638.5			14-24-33 N=57			
5		<b>SILTY SAND (SM)</b> , fine to coarse grained, reddish brown, yellowish brown, and white, dense	8.0	636			13-16-16 N=32			
6		<b>PARTIALLY WEATHERED ROCK (PWR)</b> , sampled as reddish brown and grayish brown, silty SAND	9.5	634.5			25-50/6"			
<b>Boring Terminated at 9.5 Feet</b>										

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).                  See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p> <p><b>Notes</b>                  Elevation Reference: Elevations were interpolated from a topographic site plan.</p>	<p><b>Water Level Observations</b>                  No free water observed</p> <p> Dry Cave-In</p> <p><b>Advancement Method</b>                  Hollow Stem Auger</p> <p><b>Abandonment Method</b>                  Boring backfilled with auger cuttings upon completion.</p>	<p><b>Drill Rig</b>                  CME 550X</p> <p><b>Hammer Type</b>                  Automatic</p> <p><b>Driller</b>                  J. Cain</p> <p><b>Logged by</b>                  M. Bovenzi</p> <p><b>Boring Started</b>                  10-25-2022</p> <p><b>Boring Completed</b>                  10-25-2022</p>
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## Boring Log No. B-105

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3951° Longitude: -80.7328°	Depth (Ft.)	Elevation: 634 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
									LL-PL-PI	Percent Fines
1		Depth (Ft.)	0.6	633.4						
		<b>TOPSOIL</b> , 7-inches <b>SANDY SILT (ML)</b> , brown, stiff, residual					7-8-6 N=14			
		<b>SILT WITH SAND (ML)</b> , brown, grayish brown, and yellowish brown, medium stiff to very stiff	3.0	631			7-8-10 N=18			
5		<b>SILT WITH SAND (ML)</b> , brown, grayish brown, and reddish brown			5		3-6-7 N=13			
		<b>Boring Terminated at 10 Feet</b>	10.0	624	10		2-4-4 N=8			

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).                  See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p> <p><b>Notes</b>                  Elevation Reference: Elevations were interpolated from a topographic site plan.</p>	<p><b>Water Level Observations</b>                  No free water observed</p> <p> Dry Cave-In</p> <p><b>Advancement Method</b>                  Hollow Stem Auger</p> <p><b>Abandonment Method</b>                  Boring backfilled with auger cuttings upon completion.</p>	<p><b>Drill Rig</b>                  CME 550X</p> <p><b>Hammer Type</b>                  Automatic</p> <p><b>Driller</b>                  J. Cain</p> <p><b>Logged by</b>                  M. Bovenzi</p> <p><b>Boring Started</b>                  10-25-2022</p> <p><b>Boring Completed</b>                  10-25-2022</p>
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## Boring Log No. B-106

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3957° Longitude: -80.7341°	Depth (Ft.)	Elevation: 633 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
									LL-PL-PI	Percent Fines
1		0.3 <b>TOPSOIL</b> , 4-inches	0.3	632.7						
4		<b>FAT CLAY WITH SAND (CH)</b> , red, reddish brown, and yellowish brown, medium stiff to stiff, residual					3-4-5 N=9	33.0	70-29-41	76
		Grayish brown and white					2-2-4 N=6	37.9	62-30-32	71
5		5.5 <b>SANDY SILT (ML)</b> , trace mica, light brown and brown, stiff	5.5	627.5						
		<b>SILTY SAND (SM)</b> , with manganese, fine to coarse grained, black, light brown, and brown, medium dense to dense					2-4-6 N=10			
		8.0	8.0	625			4-5-5 N=10			
		Light brown, reddish brown, and white					5-9-13 N=22			
		20.0 <b>Boring Terminated at 20 Feet</b>	20.0	613			9-14-16 N=30			

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).                  See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p> <p><b>Notes</b>                  Elevation Reference: Elevations were interpolated from a topographic site plan.</p>	<p><b>Water Level Observations</b>                  No free water observed</p> <p> Dry Cave-In</p> <p><b>Advancement Method</b>                  Hollow Stem Auger</p> <p><b>Abandonment Method</b>                  Boring backfilled with auger cuttings after delayed water levels were measured.</p>	<p><b>Drill Rig</b>                  CME 550X</p> <p><b>Hammer Type</b>                  Automatic</p> <p><b>Driller</b>                  J. Cain</p> <p><b>Logged by</b>                  M. Bovenzi</p> <p><b>Boring Started</b>                  10-25-2022</p> <p><b>Boring Completed</b>                  10-25-2022</p>
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## Boring Log No. B-107

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3954° Longitude: -80.7340°	Depth (Ft.)	Elevation: 627 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
									LL-PL-PI	Percent Fines
1		<b>TOPSOIL</b> , 6-inches	0.5	626.5						
4		<b>FAT CLAY WITH SAND (CH)</b> , reddish brown and yellowish brown, stiff to very stiff, residual					5-6-8 N=14			
						3-7-10 N=17	27.7	69-29-40	80	
5		<b>SANDY SILT (ML)</b> , reddish brown, yellowish brown, and light brown	5.5	621.5						
						5-9-13 N=22				
						3-6-7 N=13	20.0	43-29-14	60	
5		<b>SANDY SILT (ML)</b> , white, brown, and grayish brown, medium stiff to very stiff	12.0	615						
						2-2-4 N=6				
							6-10-12 N=22			
		<b>Boring Terminated at 20 Feet</b>	20.0	607						

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).</p> <p>See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p>	<p><b>Water Level Observations</b> No free water observed</p> <p> Dry Cave-In</p> <p><b>Advancement Method</b> Hollow Stem Auger</p> <p><b>Abandonment Method</b> Boring backfilled with auger cuttings after delayed water levels were measured.</p>	<p><b>Drill Rig</b> CME 550X</p> <p><b>Hammer Type</b> Automatic</p> <p><b>Driller</b> J. Cain</p> <p><b>Logged by</b> M. Bovenzi</p> <p><b>Boring Started</b> 10-25-2022</p> <p><b>Boring Completed</b> 10-25-2022</p>
<p><b>Notes</b> Elevation Reference: Elevations were interpolated from a topographic site plan.</p>		

## Boring Log No. B-108

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3959° Longitude: -80.7347° Depth (Ft.) Elevation: 612 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
								LL-PL-PI	Percent Fines
1		<b>TOPSOIL</b> , 8-inches	0.7						
2		<b>FILL - SILT WITH SAND (ML)</b> , reddish brown and grayish brown, very stiff	3.0			5-10-10 N=20			
		<b>FILL - SANDY SILT (ML)</b> , reddish brown and light brown, very stiff	5.5			7-12-13 N=25			
5		<b>SILT WITH SAND (ML)</b> , trace mica, reddish brown and brown, stiff, residual	8.0			4-5-7 N=12			
		<b>SANDY SILT (ML)</b> , light brown, gray, and yellowish brown, stiff	12.0			3-4-7 N=11			
		<b>SILT (ML)</b> , trace sand, with manganese, grayish brown, yellowish brown, and black, medium stiff	15.0			2-2-4 N=6			
<b>Boring Terminated at 15 Feet</b>			15						

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.

**Notes**

Elevation Reference: Elevations were interpolated from a topographic site plan.

**Water Level Observations**

- While drilling
- Not encountered at completion of drilling
- At end of day
- Wet Cave-In

**Advancement Method**

Hollow Stem Auger

**Abandonment Method**

Boring backfilled with auger cuttings after delayed water levels were measured.

**Drill Rig**  
CME 550X

**Hammer Type**  
Automatic

**Driller**  
J. Cain

**Logged by**  
M. Bovenzi

**Boring Started**  
10-25-2022

**Boring Completed**  
10-25-2022

## Boring Log No. B-109

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3954° Longitude: -80.7345° Depth (Ft.) Elevation: 625 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
								LL-PL-PI	Percent Fines
1		<b>TOPSOIL</b> , 5-inches	0.4						
5		<b>CLAYEY SAND (SC)</b> , fine to coarse grained, brown, medium dense, residual	3.0			2-4-6 N=10	15.9	70-27-43	47
4		<b>SANDY ELASTIC SILT (MH)</b> , with manganese, reddish brown, yellowish brown, and black, medium stiff to stiff  With mica  With light brown	12.0			2-4-5 N=9  2-5-3 N=8  2-2-3 N=5	32.0	61-32-29	66
5		<b>SANDY SILT (ML)</b> , trace manganese, light brown and yellowish brown, stiff	17.0			2-4-5 N=9			
		<b>SILTY SAND (SM)</b> , with manganese, fine to coarse grained, grayish brown, light brown, and black, medium dense	20.0			2-5-7 N=12			
		<b>Boring Terminated at 20 Feet</b>	20.0						

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.

**Notes**

Elevation Reference: Elevations were interpolated from a topographic site plan.

**Water Level Observations**  
 No free water observed

Dry Cave-In

**Advancement Method**  
 Hollow Stem Auger

**Abandonment Method**  
 Boring backfilled with auger cuttings upon completion.

**Drill Rig**  
 CME 550X

**Hammer Type**  
 Automatic

**Driller**  
 J. Cain

**Logged by**  
 S. Bledsoe

**Boring Started**  
 10-25-2022

**Boring Completed**  
 10-25-2022

## Boring Log No. B-110

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3960° Longitude: -80.7352°	Depth (Ft.)	Elevation: 607 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
									LL-PL-PI	Percent Fines
1		Depth (Ft.)	0.4	606.6						
		<b>TOPSOIL</b> , 5-inches <b>SILTY SAND (SM)</b> , fine to coarse grained, brown and light brown, medium dense, residual	3.0	604			3-5-6 N=11			
		<b>SANDY SILT (ML)</b> , dark grayish brown, black, and light brown, stiff	5.5	601.5			5-5-5 N=10			
5		<b>SANDY LEAN CLAY (CL)</b> , with manganese, gray, grayish brown, and brown, medium stiff  Yellowish brown, gray, trace white	12.0	595			3-3-4 N=7			
		<b>SANDY FAT CLAY (CH)</b> , gray, brown, and light brown, medium stiff	15.0	592			3-3-5 N=8			
4		<b>Boring Terminated at 15 Feet</b>					3-2-4 N=6			

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).                  See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p> <p><b>Notes</b>                  Elevation Reference: Elevations were interpolated from a topographic site plan.</p>	<p><b>Water Level Observations</b>                  No free water observed</p> <p> Dry Cave-In</p> <p><b>Advancement Method</b>                  Hollow Stem Auger</p> <p><b>Abandonment Method</b>                  Boring backfilled with auger cuttings after delayed water levels were measured.</p>	<p><b>Drill Rig</b>                  CME 550X</p> <p><b>Hammer Type</b>                  Automatic</p> <p><b>Driller</b>                  S. Bledsoe</p> <p><b>Logged by</b>                  M. Bovenzi</p> <p><b>Boring Started</b>                  10-25-2022</p> <p><b>Boring Completed</b>                  10-25-2022</p>
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# Boring Log No. B-111

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 35.3956° Longitude: -80.7353° Depth (Ft.) Elevation: 605 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
								LL-PL-PI	Percent Fines
1		<b>TOPSOIL</b> , 7-inches	0.6						
3		<b>ALLUVIAL - SILTY SAND (SM)</b> , fine to coarse grained, dark brown and yellowish brown, loose	3.0			1-4-4 N=8			
		<b>ALLUVIAL - SANDY LEAN CLAY (CL)</b> , grayish brown and brown, very soft to soft	8.0			1-2-2 N=4			
		Gray, trace brown	8.0			0-0-0 N=0			
5		<b>LEAN CLAY WITH SAND (CL)</b> , gray and brown, medium stiff	10.0			1-2-3 N=5			
		Gray and black, trace white	15.0			2-3-5 N=8			
<b>Boring Terminated at 15 Feet</b>			15						

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.

**Notes**

Elevation Reference: Elevations were interpolated from a topographic site plan.

**Water Level Observations**

- Not encountered while drilling
- At completion of drilling
- At end of day
- Wet Cave-In

**Advancement Method**

Hollow Stem Auger

**Abandonment Method**

Boring backfilled with auger cuttings after delayed water levels were measured.

**Drill Rig**  
CME 550X

**Hammer Type**  
Automatic

**Driller**  
J. Cain

**Logged by**  
M. Bovenzi

**Boring Started**  
10-25-2022

**Boring Completed**  
10-25-2022

## Boring Log No. B-112

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 35.3953° Longitude: -80.7349° Depth (Ft.) Elevation: 612 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
								LL-PL-PI	Percent Fines
1		<b>TOPSOIL</b> , 5-inches	0.4						
		<b>CLAYEY SAND (SC)</b> , trace manganese, fine to coarse grained, reddish brown and yellowish brown, medium dense, residual  Yellowish brown, grayish brown, and brown	5.5			7-10-11 N=21			
			5			10-10-10 N=20	10.7	31-15-16	40
5		<b>LEAN CLAY WITH SAND (CL)</b> , gray and dark brown, trace yellowish brown, very stiff	8.0			8-12-13 N=25			
		<b>SILTY SAND (SM)</b> , fine to coarse grained, black and dark brown, medium dense	12.0			5-5-5 N=10			
6		<b>PARTIALLY WEATHERED ROCK (PWR)</b> , sampled as gray, black, and white, silty SAND	15.0			18-36-50/6"			
<b>Boring Terminated at 15 Feet</b>			15						

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).  
 See [Supporting Information](#) for explanation of symbols and abbreviations.

**Notes**

Elevation Reference: Elevations were interpolated from a topographic site plan.

**Water Level Observations**

- While drilling
- At completion of drilling
- At end of day
- Wet Cave-In

**Advancement Method**  
 Hollow Stem Auger

**Abandonment Method**

Boring backfilled with auger cuttings after delayed water levels were measured.

**Drill Rig**  
 CME 550X

**Hammer Type**  
 Automatic

**Driller**  
 J. Cain

**Logged by**  
 M. Bovenzi

**Boring Started**  
 10-25-2022

**Boring Completed**  
 10-25-2022



## Boring Log No. B-113

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3948° Longitude: -80.7347°	Depth (Ft.)	Elevation: 619 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
									LL-PL-PI	Percent Fines
1		Depth (Ft.) 0.4 <b>TOPSOIL</b> , 5-inches		618.6						
5		<b>SANDY LEAN CLAY (CL)</b> , trace manganese and quartz, reddish brown and black, very stiff, residual					4-7-8 N=15	17.0	46-18-28	53
		Grayish brown, yellowish brown, and reddish brown					5-8-11 N=19			
		5.5		613.5						
		<b>SILT WITH SAND (ML)</b> , yellowish brown and reddish brown, stiff to very stiff					4-8-9 N=17			
		Trace mica					3-6-6 N=12			
		12.0		607						
		<b>SILT (ML)</b> , trace sand, with manganese, grayish brown and light brown, medium stiff					1-4-4 N=8			
		15.0		604						
<b>Boring Terminated at 15 Feet</b>			15							

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).                  See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p> <p><b>Notes</b>                  Elevation Reference: Elevations were interpolated from a topographic site plan.</p>	<p><b>Water Level Observations</b>                  No free water observed</p> <p> Dry Cave-In</p> <p><b>Advancement Method</b>                  Hollow Stem Auger</p> <p><b>Abandonment Method</b>                  Boring backfilled with auger cuttings after delayed water levels were measured.</p>	<p><b>Drill Rig</b>                  CME 550X</p> <p><b>Hammer Type</b>                  Automatic</p> <p><b>Driller</b>                  J. Cain</p> <p><b>Logged by</b>                  M. Bovenzi</p> <p><b>Boring Started</b>                  10-24-2022</p> <p><b>Boring Completed</b>                  10-24-2022</p>
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## Boring Log No. B-114

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3943° Longitude: -80.7353°	Depth (Ft.)	Elevation: 632 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
									LL-PL-PI	Percent Fines
1		0.3 <b>TOPSOIL</b> , 4-inches	0.3	631.7						
		<b>FILL - SANDY LEAN CLAY (CL)</b> , grayish brown, yellowish brown, and black, medium stiff to stiff					4-4-5 N=9			
2		Brown and grayish brown, trace gravel								
		5.5 <b>FILL - SANDY SILT (ML)</b> , grayish brown and yellowish brown, stiff	5.5	626.5			3-3-4 N=7	16.6	43-19-24	53
2		8.0 <b>FILL - SANDY LEAN CLAY (CL)</b> , brown and grayish brown, stiff	8.0	624						
		Black rubber debris in auger cuttings from approximately 11 to 12 feet								
2		12.0 <b>FILL - SANDY SILT (ML)</b> , reddish brown and yellowish brown, stiff	12.0	620						
		17.0 <b>FILL - CLAYEY SAND (SC)</b> , fine to coarse grained, yellowish brown, reddish brown, and gray, medium dense	17.0	615						
5		22.0 <b>SILT (ML)</b> , trace sand, with manganese, light brown, yellowish brown, and black, soft to stiff, residual	22.0	610						
							1-1-2 N=3			

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).</p> <p>See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p> <p><b>Notes</b> Elevation Reference: Elevations were interpolated from a topographic site plan.</p>	<p><b>Water Level Observations</b> No free water observed</p> <p> Dry Cave-In</p> <p><b>Advancement Method</b> Hollow Stem Auger</p> <p><b>Abandonment Method</b> Boring backfilled with auger cuttings after delayed water levels were measured.</p>	<p><b>Drill Rig</b> CME 550X</p> <p><b>Hammer Type</b> Automatic</p> <p><b>Driller</b> J. Cain</p> <p><b>Logged by</b> M. Bovenzi</p> <p><b>Boring Started</b> 10-24-2022</p> <p><b>Boring Completed</b> 10-24-2022</p>
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## Boring Log No. B-114

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3943° Longitude: -80.7353°	Depth (Ft.)	Elevation: 632 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	
									LL-PL-PI	Percent Fines
5		<p>Depth (Ft.)</p> <p><b>SILT (ML)</b>, trace sand, with manganese, light brown, yellowish brown, and black, soft to stiff, residual (<i>continued</i>)</p> <p style="text-align: center;">Gray and grayish brown, trace white</p> <p style="text-align: right;">35.0</p>	30			1-3-3 N=6				
		597	35			3-5-8 N=13				
		<b>Boring Terminated at 35 Feet</b>								



<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).</p> <p>See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p>	<p><b>Water Level Observations</b> No free water observed</p> <p> Dry Cave-In</p>	<p><b>Drill Rig</b> CME 550X</p> <p><b>Hammer Type</b> Automatic</p> <p><b>Driller</b> J. Cain</p> <p><b>Logged by</b> M. Bovenzi</p> <p><b>Boring Started</b> 10-24-2022</p> <p><b>Boring Completed</b> 10-24-2022</p>
<p><b>Notes</b> Elevation Reference: Elevations were interpolated from a topographic site plan.</p>	<p><b>Advancement Method</b> Hollow Stem Auger</p> <p><b>Abandonment Method</b> Boring backfilled with auger cuttings after delayed water levels were measured.</p>	

# Boring Log No. B-115

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 35.3943° Longitude: -80.7356° Depth (Ft.) Elevation: 630 (Ft.) +/-	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits		
								LL-PL-PI	Percent Fines	
1		0.3 <b>TOPSOIL</b> , 3.5-inches	629.7							
1		<b>FILL - SANDY LEAN CLAY (CL)</b> , brown and grayish brown, stiff  Trace rootlets  Reddish brown, dark brown, and light brown, trace gravel	5			5-5-5 N=10	19.2			
						7-7-7 N=14				
						4-5-5 N=10				47-19-28
2		8.0 <b>FILL - CLAYEY SAND (SC)</b> , fine to coarse grained, brown, grayish brown, and black, loose	622							
2		<b>FILL - SANDY LEAN CLAY (CL)</b> , with root matter, grayish brown, yellowish brown, and dark brown, stiff	10			2-3-4 N=7	17.0		38-16-22	47
						12.0				
5		<b>SANDY SILT (ML)</b> , with manganese, grayish brown, light brown, and black, stiff, residual	15				19.3			
						17.0				
		<b>Boring Terminated at 20 Feet</b>	20							

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).</p> <p>See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p>	<p><b>Water Level Observations</b> No free water observed</p>	<p><b>Drill Rig</b> CME 550X</p>
	<p> Dry Cave-In</p>	<p><b>Hammer Type</b> Automatic</p>
<p><b>Notes</b> Elevation Reference: Elevations were interpolated from a topographic site plan.</p>	<p><b>Advancement Method</b> Hollow Stem Auger</p>	<p><b>Logged by</b> M. Bovenzi</p>
	<p><b>Abandonment Method</b> Boring backfilled with auger cuttings after delayed water levels were measured.</p>	<p><b>Boring Started</b> 10-24-2022</p>
		<p><b>Boring Completed</b> 10-24-2022</p>

## Boring Log No. B-116

Model Layer	Graphic Log	Location: See <a href="#">Exploration Plan</a> Latitude: 35.3950° Longitude: -80.7337°	Depth (Ft.)	Elevation: 628 (Ft.) +/-	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		Depth (Ft.) 0.5 <b>TOPSOIL</b> , 6-inches	0.5	627.5						
4		<b>SANDY FAT CLAY (CH)</b> , brown, residual	2.5	625.5				18.0	62-25-37	53
<b>Boring Terminated at 2.5 Feet</b>										

<p>See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).                  See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.</p> <p><b>Notes</b>                  Elevation Reference: Elevations were interpolated from a topographic site plan.                  Undisturbed sample obtained from approximately .5 to 2.5 feet</p>	<p><b>Water Level Observations</b>                  No free water observed</p> <p style="text-align: center;">Cave-In not recorded</p> <p><b>Advancement Method</b>                  Hollow Stem Auger</p> <p><b>Abandonment Method</b>                  Boring backfilled with auger cuttings after delayed water levels were measured.</p>	<p><b>Drill Rig</b>                  CME 550X</p> <p><b>Hammer Type</b>                  Automatic</p> <p><b>Driller</b>                  J. Cain</p> <p><b>Logged by</b>                  M. Bovenzi</p> <p><b>Boring Started</b>                  10-24-2022</p> <p><b>Boring Completed</b>                  10-24-2022</p>
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# SUMMARY OF LABORATORY RESULTS

BORING ID	Depth (Ft.)	Soil Classification USCS	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Fines
B-101	1-2.5	CLAYEY SAND(SC)	14.2	34	18	16	39.8
B-103	1-2.5	SANDY LEAN CLAY(CL)	12.2	39	19	20	55.0
B-106	1-2.5	FAT CLAY with SAND(CH)	33.0	70	29	41	76.1
B-106	3-5.5	FAT CLAY with SAND(CH)	37.9	62	30	32	71.3
B-107	3-5.5	FAT CLAY with SAND(CH)	27.7	69	29	40	80.0
B-107	8.5-10	SANDY SILT(ML)	20.0	43	29	14	59.6
B-109	1-2.5	CLAYEY SAND(SC)	15.9	70	27	43	47.0
B-109	6-7.5	SANDY ELASTIC SILT(MH)	32.0	61	32	29	66.4
B-112	3-5-5	CLAYEY SAND(SC)	10.7	31	15	16	40.1
B-113	1-2.5	SANDY LEAN CLAY(CL)	17.0	46	18	28	53.5
B-114	3-5-5	SANDY LEAN CLAY(CL)	16.6	43	19	24	53.2
B-114	8.5-10		14.8				
B-114	13.5-15		21.6				
B-114	18.5-20	CLAYEY SAND(SC)	20.9	51	14	37	49.3
B-115	3-5-5		19.2				
B-115	6-7.5	SANDY LEAN CLAY(CL)	15.5	47	19	28	52.3
B-115	8.5-10	CLAYEY SAND(SC)	17.0	38	16	22	46.8
B-115	13.5-15	SANDY LEAN CLAY(CL)	19.3	47	13	34	54.8
B-116	0.5-2.5	SANDY FAT CLAY(CH)	18.0	62	25	37	52.8

PROJECT: North West Community Park

SITE: 1252 Cox Mill Rd  
Concord, NC



2701 Westport Rd  
Charlotte, NC

PH. 704-509-1777

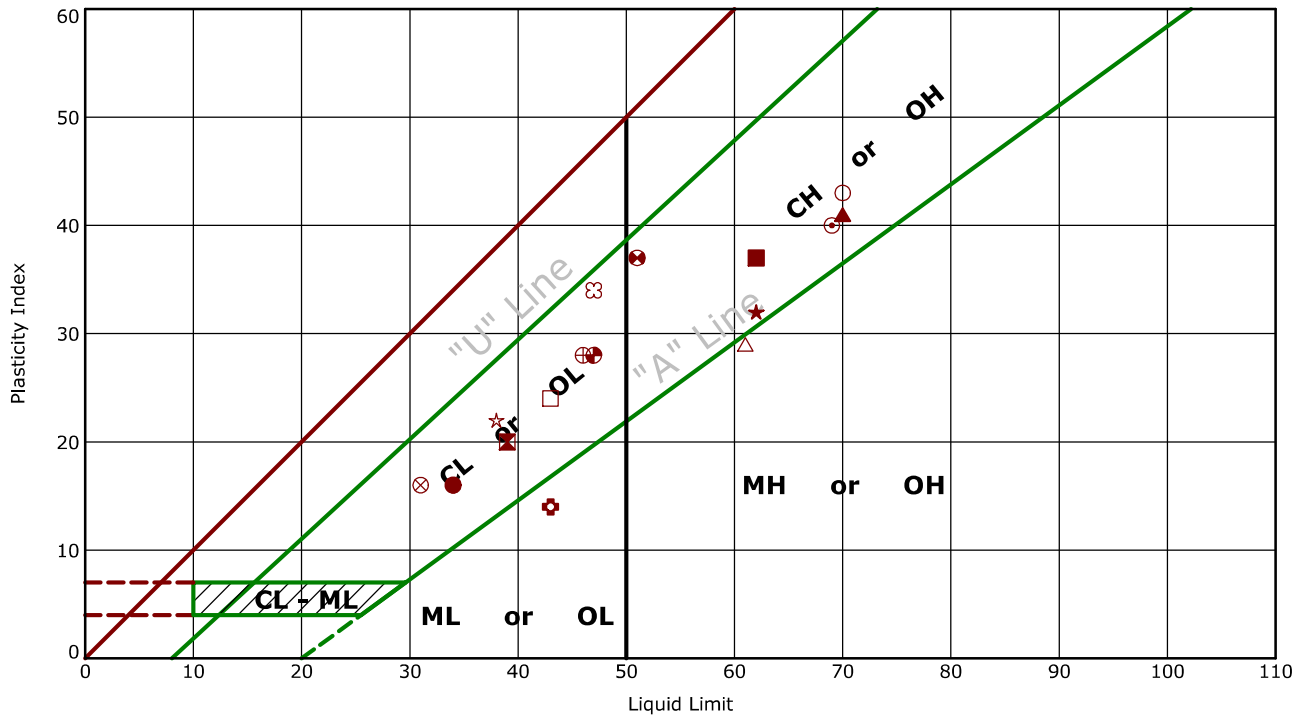
FAX. 704-509-1888

PROJECT NUMBER: 71225209

CLIENT: Woolpert Inc  
Charlotte, NC

# Atterberg Limit Results

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-101	1 - 2.5	34	18	16	39.8	SC	CLAYEY SAND
⊠	B-103	1 - 2.5	39	19	20	55.0	CL	SANDY LEAN CLAY
▲	B-106	1 - 2.5	70	29	41	76.1	CH	FAT CLAY with SAND
★	B-106	3.5 - 5	62	30	32	71.3	CH	FAT CLAY with SAND
⊙	B-107	3.5 - 5	69	29	40	80.0	CH	FAT CLAY with SAND
⊕	B-107	8.5 - 10	43	29	14	59.6	ML	SANDY SILT
○	B-109	1 - 2.5	70	27	43	47.0	SC	CLAYEY SAND
△	B-109	6 - 7.5	61	32	29	66.4	MH	SANDY ELASTIC SILT
⊗	B-112	3.5 - 5	31	15	16	40.1	SC	CLAYEY SAND
⊕	B-113	1 - 2.5	46	18	28	53.5	CL	SANDY LEAN CLAY
□	B-114	3.5 - 5	43	19	24	53.2	CL	SANDY LEAN CLAY
⊕	B-114	18.5 - 20	51	14	37	49.3	SC	CLAYEY SAND
⊕	B-115	6 - 7.5	47	19	28	52.3	CL	SANDY LEAN CLAY
★	B-115	8.5 - 10	38	16	22	46.8	SC	CLAYEY SAND
⊗	B-115	13.5 - 15	47	13	34	54.8	CL	SANDY LEAN CLAY
■	B-116	0.5 - 2.5	62	25	37	52.8	CH	SANDY FAT CLAY

**MEASUREMENT OF HYDRAULIC CONDUCTIVITY OF SATURATED POROUS MATERIALS  
USING A FLEXIBLE WALL PERMEAMETER  
ASTM D 5084 - 90 METHOD C TEST WITH INCREASING TAILWATER LEVEL**

PROJECT: North West Community Park      TERRACON JOB #: 71225209  
 SAMPLE ID: B-116 @(0.5-2.0)ft Sh      DATE: 10/27/2022  
 DESCR.: Brown Sandy CLAY-CHRed Sandy SILT-ML

BURETTE Area      0.985      cm<sup>2</sup>

INITIAL					
MOISTURE%	DENSITY				
W & T, g	514.88	WET WT, g	972.2		
D & T, g	438.70	DIA, in	2.85	7.25	cm
T, g	15.87	HT, in	4.64	11.79	cm
		AREA		41.27	cm <sup>2</sup>
MOIST-URE, %	18.0	DENSITY: 124.8	PCF WET		
		DENSITY: 105.7	PCF DRY		

SPEC GRAV:	2.650	REMOLD (Y/N):	N
POROSITY, %:	36.1	PROCTOR:	NA
SATURATION, %:	84.5	OPTIMUM:	NA
VOID RATIO:	0.56	COMPACTION, %:	OVER OPTIMUM, %:

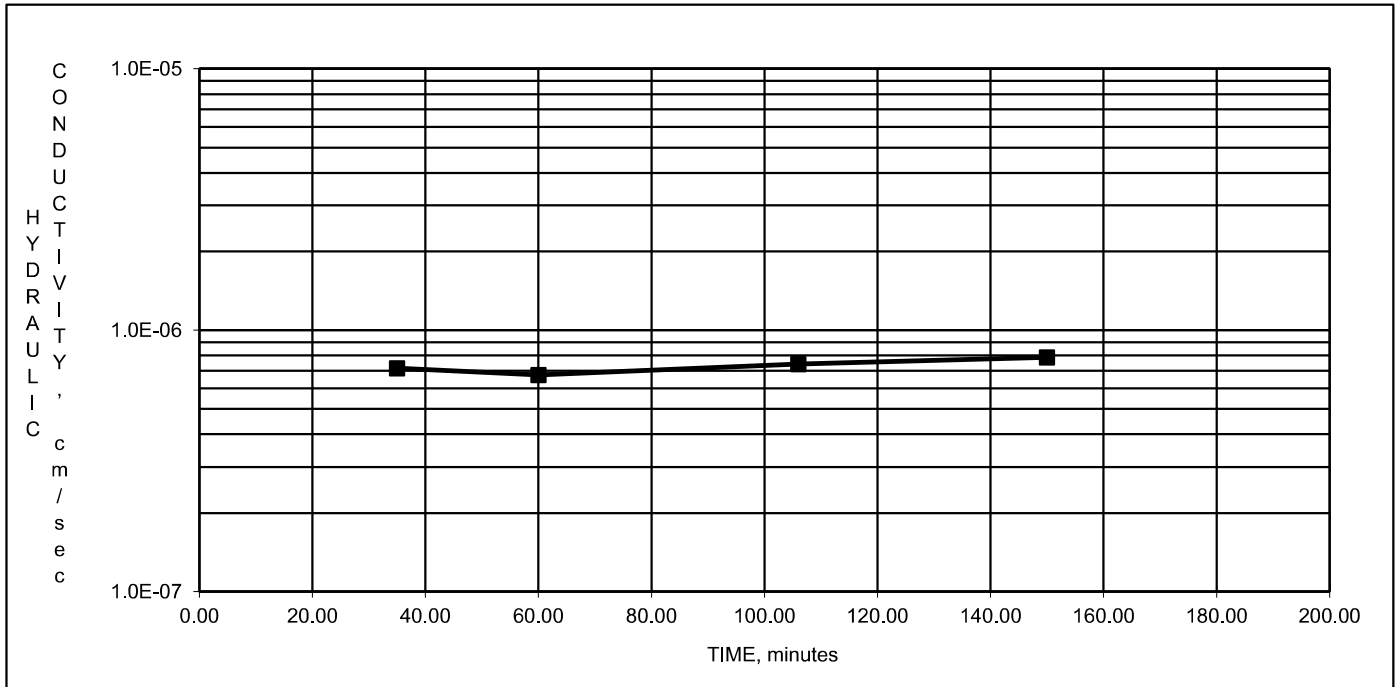
<b>SATURATION:</b>	CHAMBER PRESS.:	73.0	psi	BACK PRESSURE (=UPPER=LOWER):	70.0	psi
<b>TEST:</b>	CHAMBER PRESS.:	75.0	psi	UPPER:	70.0	psi
				LOWER:	69.5	psi
	EFFECT. CONSOL. STRESS:	5.0	psi	BIAS PRESSURE (=LOWER-UPPER)	0.5	psi

Burette Reading	ELAPSED	DELTA			OUT	IN			HYD	% FROM	TEMP.:	TEMP.
Upper	TIME	H	Ln	HYD CON	FLOW	FLOW	OUT/IN	GRAD	MEAN k	C	CORR.:	
cm	min	cm	H1/H2	k, cm/sec	cm <sup>3</sup>	cm <sup>3</sup>	RATIO					
0.0	0.00	27.0										
0.3	35.00	26.3	0.010920	7.17E-07	0.3	0.3	1.00	5.2	2	21	0.980	
0.6	60.03	25.9	0.007347	6.74E-07	0.2	0.2	1.00	5.2	8	21	0.980	
1.0	106.00	25.0	0.014857	7.42E-07	0.4	0.4	1.00	5.1	2	21	0.980	
1.5	150.00	24.1	0.015081	7.87E-07	0.4	0.4	1.00	5.0	8	21	0.980	

HYDRAULIC CONDUCTIVITY (k) = **AVERAGE 7.3E-07 cm/sec**

MAXIMUM	1.0E-03 TO 1.0E-04	2	0.75<	% < 25 AT
HYDRAULIC GRADIENT	1.0E-04 TO 1.0E-05	5	RATIO	> 1.0E-8
	1.0E-05 TO 1.0E-06	10	<1.25	OR
	1.0E-06 TO 1.0E-07	20		% < 50 AT
	1.0E-07 TO 1.0E-10	30		< 1.0E-8

NUMBER OF PORE VOLUMES PASSED = 0.0082





## Supporting Information

### **Contents:**







General Notes

Unified Soil Classification System

Boring Logs, Geomodel, and Laboratory testing form "Preliminary Geotechnical Engineering Report, Northwest Community Park," dated March 4, 2022, Terracon Project No. 71215219. (10 pages)

Note: All attachments are one page unless noted above.

## General Notes

Sampling	Water Level	Field Tests
 Shelby Tube  Standard Penetration Test	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time  Cave In Encountered  Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

### Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

### Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

### Strength Terms

Relative Density of Coarse-Grained Soils (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance		Consistency of Fine-Grained Soils (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
Relative Density	Standard Penetration or N-Value (Blows/Ft.)	Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

### Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

## Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests <sup>A</sup>				Soil Classification	
				Group Symbol	Group Name <sup>B</sup>
<b>Coarse-Grained Soils:</b> More than 50% retained on No. 200 sieve	<b>Gravels:</b> More than 50% of coarse fraction retained on No. 4 sieve	<b>Clean Gravels:</b> Less than 5% fines <sup>C</sup>	$Cu \geq 4$ and $1 \leq Cc \leq 3$ <sup>E</sup>	GW	Well-graded gravel <sup>F</sup>
		<b>Gravels with Fines:</b> More than 12% fines <sup>C</sup>	$Cu < 4$ and/or $[Cc < 1$ or $Cc > 3.0]$ <sup>E</sup>	GP	Poorly graded gravel <sup>F</sup>
			Fines classify as ML or MH	GM	Silty gravel <sup>F, G, H</sup>
		<b>Sands:</b> 50% or more of coarse fraction passes No. 4 sieve	<b>Clean Sands:</b> Less than 5% fines <sup>D</sup>	Fines classify as CL or CH	GC
	$Cu \geq 6$ and $1 \leq Cc \leq 3$ <sup>E</sup>			SW	Well-graded sand <sup>I</sup>
	<b>Sands with Fines:</b> More than 12% fines <sup>D</sup>		$Cu < 6$ and/or $[Cc < 1$ or $Cc > 3.0]$ <sup>E</sup>	SP	Poorly graded sand <sup>I</sup>
			Fines classify as ML or MH	SM	Silty sand <sup>G, H, I</sup>
	<b>Fine-Grained Soils:</b> 50% or more passes the No. 200 sieve	<b>Silts and Clays:</b> Liquid limit less than 50	<b>Inorganic:</b>	PI > 7 and plots above "A" line <sup>J</sup>	CL
PI < 4 or plots below "A" line <sup>J</sup>				ML	Silt <sup>K, L, M</sup>
<b>Organic:</b>			$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OL	Organic clay <sup>K, L, M, N</sup> Organic silt <sup>K, L, M, O</sup>
			<b>Silts and Clays:</b> Liquid limit 50 or more	<b>Inorganic:</b>	PI plots on or above "A" line
PI plots below "A" line		MH			Elastic silt <sup>K, L, M</sup>
<b>Organic:</b>		$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$		OH	Organic clay <sup>K, L, M, P</sup> Organic silt <sup>K, L, M, Q</sup>
		<b>Highly organic soils:</b>		Primarily organic matter, dark in color, and organic odor	

<sup>A</sup> Based on the material passing the 3-inch (75-mm) sieve.

<sup>B</sup> If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

<sup>C</sup> Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

<sup>D</sup> Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

<sup>E</sup>  $Cu = D_{60}/D_{10}$      $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

<sup>F</sup> If soil contains  $\geq 15\%$  sand, add "with sand" to group name.

<sup>G</sup> If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

<sup>H</sup> If fines are organic, add "with organic fines" to group name.

<sup>I</sup> If soil contains  $\geq 15\%$  gravel, add "with gravel" to group name.

<sup>J</sup> If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

<sup>K</sup> If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

<sup>L</sup> If soil contains  $\geq 30\%$  plus No. 200 predominantly sand, add "sandy" to group name.

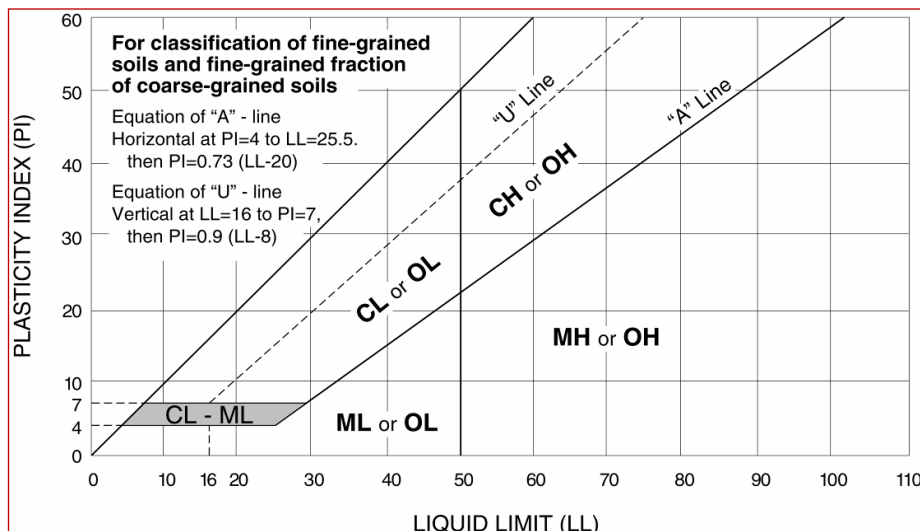
<sup>M</sup> If soil contains  $\geq 30\%$  plus No. 200, predominantly gravel, add "gravelly" to group name.

<sup>N</sup> PI  $\geq 4$  and plots on or above "A" line.

<sup>O</sup> PI < 4 or plots below "A" line.

<sup>P</sup> PI plots on or above "A" line.

<sup>Q</sup> PI plots below "A" line.



# BORING LOG NO. B-01

**PROJECT:** Northwest Community Park

**CLIENT:** Woolpert Inc  
Charlotte, NC

**SITE:** Cox Mill Road  
Concord, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a> Latitude: 35.3961° Longitude: -80.7338°	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
										LL-PL-PI		
1			0.4	630.5+/-								
		<b>TOPSOIL</b> , 5-inches										
		<b>SANDY LEAN CLAY (CL)</b> , brown with yellow, stiff, residual					X	3-4-7 N=11				
			3.0	628+/-	5		X	10-14-16 N=30				
		<b>CLAYEY SAND (SC)</b> , fine to coarse grained, brown, gray, and white, medium dense to dense					X	7-10-11 N=21				
					10		X	10-15-13 N=28				
					15	▽	X	10-11-13 N=24				
					20		X	10-10-18 N=28				
		<b>Boring Terminated at 20 Feet</b>		611+/-								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation obtained from provided topographic map.

**WATER LEVEL OBSERVATIONS**

▽ *While drilling*  
*Dry at completion of drilling*

☒ *Dry Cave-In*



Boring Started: 02-15-2022

Boring Completed: 02-15-2022

Drill Rig: Geoprobe

Driller: B. Burnette

Project No.: 71215219

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_71215219 NORTHWEST COMMUNI.GPJ TERRACON\_DATATEMPLATE.GDT 3/1/22

# BORING LOG NO. B-02

**PROJECT:** Northwest Community Park

**CLIENT:** Woolpert Inc  
Charlotte, NC

**SITE:** Cox Mill Road  
Concord, NC

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 71215219 NORTHWEST COMMUNI.GPJ TERRACON\_DATATEMPLATE.GDT 3/1/22

MODEL LAYER	GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a> Latitude: 35.3957° Longitude: -80.7337°  Approximate Surface Elev.: 638 (Ft.) +/- ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
								LL-PL-PI		
1		0.3 <b>TOPSOIL</b> , 4-inches	637.5+/-							
3		<b>SANDY ELASTIC SILT (MH)</b> , red with black, very stiff, residual			X	5-6-9 N=15	23.0	58-39-19	58	
		3.0 <b>SANDY LEAN CLAY (CL)</b> , trace mica, yellow and red, very stiff	635+/-		X	4-6-10 N=16				
		5.5 <b>SILTY SAND (SM)</b> , with mica, fine to coarse grained, white and gray, with brown, medium dense to dense	632.5+/-		X	6-12-20 N=32				
					X	9-10-14 N=24				
4					X	7-10-12 N=22				
					X	7-9-11 N=20				
		<b>Boring Terminated at 20 Feet</b>	618+/-							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation obtained from provided topographic map.

**WATER LEVEL OBSERVATIONS**

No free water observed

Dry Cave-In



Boring Started: 02-15-2022

Boring Completed: 02-15-2022

Drill Rig: Geoprobe

Driller: B. Burnette

Project No.: 71215219

# BORING LOG NO. B-03

<b>PROJECT:</b> Northwest Community Park	<b>CLIENT:</b> Woolpert Inc Charlotte, NC
<b>SITE:</b> Cox Mill Road Concord, NC	

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL. 71215219 NORTHWEST COMMUNI.GPJ TERRACON\_DATATEMPLATE.GDT 3/1/22

MODEL LAYER	GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a> Latitude: 35.3962° Longitude: -80.7331°  Approximate Surface Elev.: 643 (Ft.) +/- ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1	0.3	<b>TOPSOIL</b> , 4-inches	642.5+/-						
2	3.0	<b>FILL - SANDY LEAN CLAY (CL)</b> , yellowish brown, stiff	640+/-		X	4-4-8 N=12	27.2	48-23-25	62
4	10.0	<b>SILTY SAND (SM)</b> , fine to coarse grained, brown, white, and gray, medium dense to very dense, residual	633+/-	X	X	7-13-14 N=27			
				X	X	15-15-24 N=39			
				X	X	16-26-40 N=66			
5	14.4	<b>PARTIALLY WEATHERED ROCK (PWR)</b> , sampled as brown and gray, silty SAND	628.5+/-		X	21-50/5"			
		<b>Boring Terminated at 14.4 Feet</b>							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method: Hollow Stem Auger	See <a href="#">Exploration and Testing Procedures</a> for a description of field and laboratory procedures used and additional data (If any).  See <a href="#">Supporting Information</a> for explanation of symbols and abbreviations.  Elevation obtained from provided topographic map.	Notes:
Abandonment Method: Boring backfilled with auger cuttings upon completion.		
<b>WATER LEVEL OBSERVATIONS</b>		
<i>While drilling</i> <i>Dry at completion of drilling</i>	Boring Started: 02-15-2022      Boring Completed: 02-15-2022	
<i>Dry Cave-In</i>	Drill Rig: Geoprobe      Driller: B. Burnette	
2701 Westport Rd Charlotte, NC		Project No.: 71215219

# BORING LOG NO. B-04

**PROJECT:** Northwest Community Park

**CLIENT:** Woolpert Inc  
Charlotte, NC

**SITE:** Cox Mill Road  
Concord, NC

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_71215219 NORTHWEST COMMUNI.GPJ TERRACON\_DATATEMPLATE.GDT 3/1/22

MODEL LAYER	GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a> Latitude: 35.3957° Longitude: -80.7332°	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
										LL-PL-PI		
1			0.3	643.5+/-								
		<b>GRAVEL</b> , 3-inches										
2								3-4-11 N=15	32.5			
		<b>FILL - SANDY LEAN CLAY (CL)</b> , brown, very stiff										
			3.0	641+/-				9-11-14 N=25				
		<b>CLAYEY SAND (SC)</b> , fine to medium grained, brown and gray, medium dense to very dense, residual			5			7-10-12 N=22				
4								3-6-7 N=13				
					10							
								13-25-26 N=51				
		<b>PARTIALLY WEATHERED ROCK (PWR)</b> , sampled as brown and gray, clayey SAND		629+/-	15							
5								38-50/4"				
					20							
			15.0	629+/-								
		<b>Boring Terminated at 23.6 Feet</b>		620.5+/-				50/1"				
			23.6	620.5+/-								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:  
Boring backfilled with Auger Cuttings after delayed groundwater level readings.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation obtained from provided topographic map.

**WATER LEVEL OBSERVATIONS**

- While drilling
- Dry at completion of drilling
- Dry after 6 hours
- Dry Cave-In



Boring Started: 02-15-2022

Boring Completed: 02-15-2022

Drill Rig: Geoprobe

Driller: B. Burnette

Project No.: 71215219





# BORING LOG NO. B-06

**PROJECT:** Northwest Community Park

**CLIENT:** Woolpert Inc  
Charlotte, NC

**SITE:** Cox Mill Road  
Concord, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a> Latitude: 35.3950° Longitude: -80.7340°	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
										LL-PL-PI		
1	TOPSOIL	Approximate Surface Elev.: 623 (Ft.) +/-	0.3	622.5+/-								
	SANDY LEAN CLAY (CL)	<b>SANDY LEAN CLAY (CL)</b> , yellowish brown to yellowish brown and gray, medium stiff, residual			5			6-3-4 N=7	23.5	38-17-21	62	
	SANDY LEAN CLAY (CL)							3-3-5 N=8				
	SANDY LEAN CLAY (CL)							5-4-4 N=8				
	SANDY LEAN CLAY (CL)							2-2-3 N=5				
4	SILTY SAND (SM)	<b>SILTY SAND (SM)</b> , with mica, fine to coarse grained, brown and gray, loose to medium dense	12.0	611+/-	10			1-2-3 N=5				
	SILTY SAND (SM)							4-5-7 N=12				
	SILTY SAND (SM)		20.0	603+/-	15							
	<b>Boring Terminated at 20 Feet</b>											

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:

Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation obtained from provided topographic map.

**WATER LEVEL OBSERVATIONS**

No free water observed

Dry Cave-In



Boring Started: 02-15-2022

Boring Completed: 02-15-2022

Drill Rig: Geoprobe

Driller: B. Burnette

Project No.: 71215219




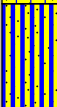

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_71215219 NORTHWEST COMMUNI.GPJ TERRACON\_DATATEMPLATE.GDT 3/1/22

# BORING LOG NO. B-07

**PROJECT:** Northwest Community Park

**CLIENT:** Woolpert Inc  
Charlotte, NC

**SITE:** Cox Mill Road  
Concord, NC

MODEL LAYER	GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a> Latitude: 35.3962° Longitude: -80.7322°  Approximate Surface Elev.: 653 (Ft.) +/- ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	ATTERBERG LIMITS		PERCENT FINES
								LL-PL-PI		
1		<b>TOPSOIL</b> , 8-inches	0.7							
		<b>LEAN CLAY WITH SAND (CL)</b> , yellow, residual	1.5			4-7-14 N=21	18.3			
		<b>SILTY SAND (SM)</b> , fine to coarse grained, brown and white, medium dense	3.0							
		<b>SANDY SILT (ML)</b> , dark gray, hard	5.5			10-14-17 N=31				
4		<b>CLAYEY SAND (SC)</b> , fine to coarse grained, brown and white, dense	10.0			12-14-21 N=35				
		<b>Boring Terminated at 10 Feet</b>				14-16-22 N=38				

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
Hollow Stem Auger

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:


Abandonment Method:  
Boring backfilled with auger cuttings upon completion.

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation obtained from provided topographic map.

**WATER LEVEL OBSERVATIONS**

No free water observed

 Dry Cave-In



Boring Started: 02-15-2022

Boring Completed: 02-15-2022

Drill Rig: Geoprobe

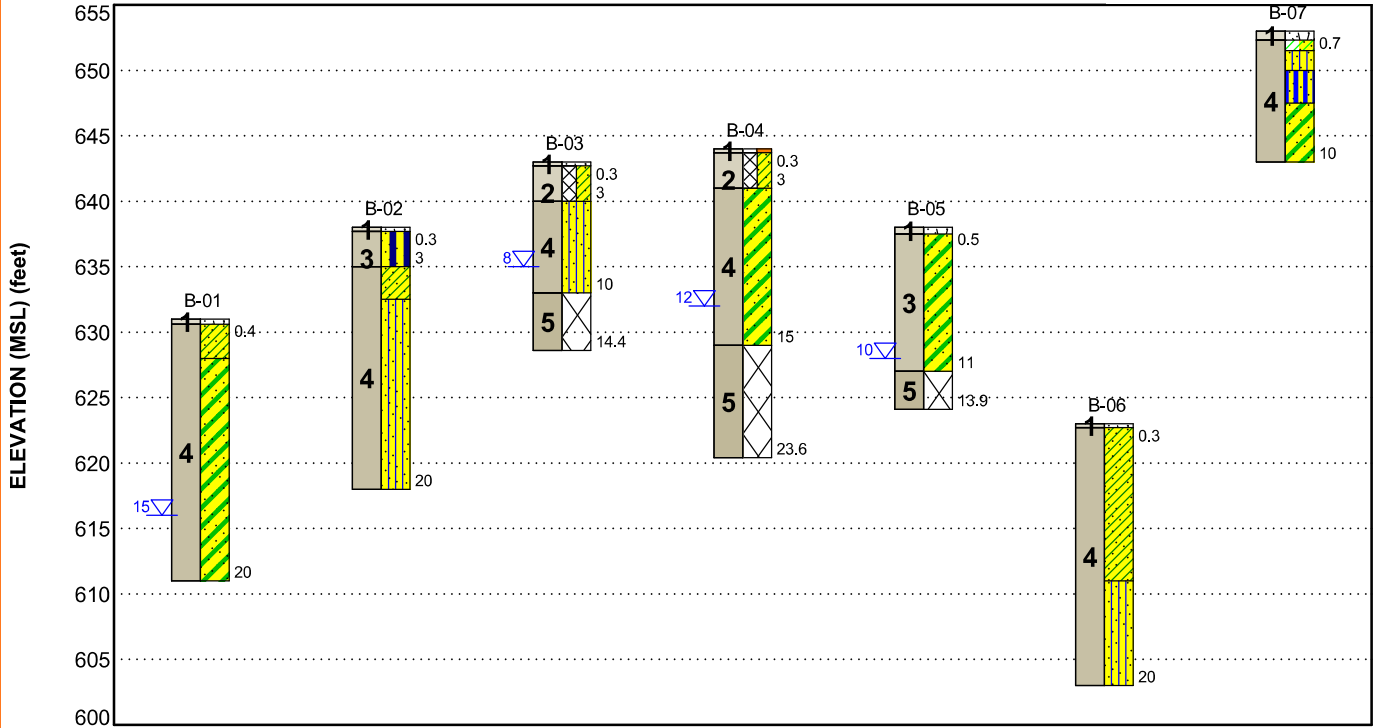
Driller: B. Burnette

Project No.: 71215219

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL\_ 71215219 NORTHWEST COMMUNI.GPJ TERRACON\_DATATEMPLATE.GDT 3/1/22

**GEOMODEL**

Northwest Community Park ■ Concord, NC  
Terracon Project No. 71215219



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Surface Material	Gravel, topsoil
2	Fill	Existing fill soils consisting of sandy LEAN CLAY
3	High Plasticity Residual	Residual soils consisting of sandy ELASTIC SILT
4	Low Plasticity Residual	Residual soils consisting of LEAN CLAY with varying amounts of sand, sandy SILT, clayey and silty SAND
5	Partially Weathered Rock (PWR)	Sampled as clayey and silty SAND

**LEGEND**

- Topsoil
- Sandy Elastic Silt
- Poorly-graded Gravel
- Sandy Lean Clay
- Silty Sand
- Lean Clay with Sand
- Clayey Sand
- Weathered Rock
- Sandy Silt

First Water Observation

**NOTES:**

Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

# Summary of Laboratory Results

BORING ID	Depth (Ft.)	Soil Classification USCS	Water Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	% Fines
B-02	1-2.5	SANDY ELASTIC SILT(MH)	23.0	58	39	19	57.8
B-03	1-2.5	SANDY LEAN CLAY(CL)	27.2	48	23	25	62.2
B-04	1-2.5		32.5				
B-05	1-2.5	CLAYEY SAND(SC)	21.1	30	18	12	40.2
B-06	1-2.5	SANDY LEAN CLAY(CL)	23.5	38	17	21	62.1
B-07	1-2.5		18.3				

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART LAB SUMMARY-PORTRAIT 71215219 NORTHWEST COMMUNI.GPJ TERRACON\_DATATEMPLATE.GDT 2/23/22

PROJECT: Northwest Community Park	 2701 Westport Rd Charlotte, NC	PROJECT NUMBER: 71215219
SITE: Cox Mill Road Concord, NC		CLIENT: Woolpert Inc Charlotte, NC

