

# Memorial High School

## Technical Specifications

OCTOBER 20, 2022



**Owner:**

Tulsa Public Schools  
Independent School District No. One  
Of Tulsa County  
3027 South New Haven  
Tulsa, Oklahoma 74114

**Architect:**

GH2 Architects, LLC  
320 South Boston Avenue, Suite 100  
Tulsa, OK 74103  
Phone: 918.587.6158  
Fax: 918.587.0357

**Construction Manager:**

Trigon  
11345 East 60<sup>th</sup> Place  
Tulsa, OK 74146  
Phone: 918.252.7162 Ext 25  
Fax: 918.250.2151

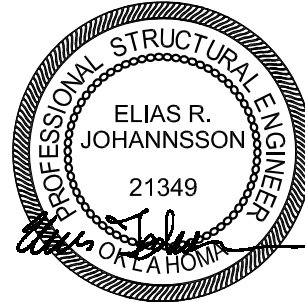
SECTION 00 0107  
SEALS PAGE

ARCHITECT: MICHAEL HALL



*Michael Hall*  
10.20.22

STRUCTURAL ENGINEER: ELLI JOHANSSON



10/20/2022

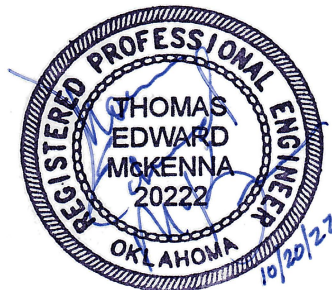
Certificate of Authorization:  
OK #5996 | EXP 6.30.2024

LANDSCAPE ARCHITECT: JEREMY CARLISLE



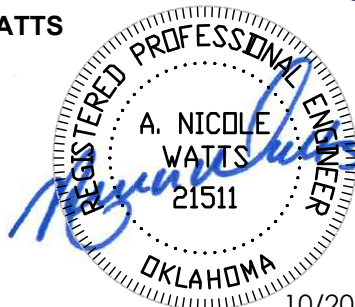
10.20.2022

ELECTRICAL ENGINEER: THOMAS MCKENNA



10/20/22

CIVIL ENGINEER: NICOLE WATTS



10/20/2022

END OF SECTION

## SECTION 000100

### INSTRUCTIONS TO BIDDERS

#### SCOPE:

#### 1. GENERAL CONDITIONS:

Standard form "General Conditions of the Contract for Construction," The American Institute of Architects, Document A201, Fourteenth Edition, 1997, ("General Conditions") shall apply to the Work, except insofar as the General Conditions are modified, amended, waived, or changed by these Supplementary General Conditions. The following paragraph numbers refer to the paragraphs in the above referenced "General Conditions":

- (a) Paragraph 1. 1. 1: The last sentence is amended to read as follows: "The Contract Documents include the advertisement or invitation to bid, notice to bidders, instructions to bidders, sample forms, the Contractor's bid or proposal, any addenda relating to the foregoing and any other documents specifically enumerated in the Owner-Contractor Agreement."
- (b) Paragraph 3.7. 1. is amended to read as follows: "When applicable, Contractor shall secure all permits, licenses and inspections necessary for the proper execution and completion of the Work. Owner will not reimburse Contractor for any fees paid by Contractor for permits and inspections."
- (c) Paragraph 13.6.1 is amended to read as follows: "Any moneys not paid within thirty (30) days after they become due and payable under the terms of this Contract shall bear interest at the rate of six percent (6%) per annum from and after said thirty (30) day period."
- (d) Paragraph 8.3.1 is amended to read as follows: "The Contractor shall not be entitled to compensation for any loss, cost or expense, sustained by reason of delay in completion of the Work from any cause whatever."
- (e) Paragraph 11.3.1 is amended to read as follows: "The Contractor shall purchase and maintain, at Contractor's expense, property insurance upon the entire Work at the site to the full insurable value thereof. This insurance shall include the interests of Owner, Contractor, Subcontractor and Sub-subcontractors in the Work and shall insure against perils of fire and extended coverage on a 'broad-form, all risk' basis for physical loss of damage, including theft, vandalism and malicious mischief. Such insurance shall be purchased from a carrier licensed to do business in the State of Oklahoma. Certificates of such insurance shall be delivered to the Department Manager of Building Planning, Maintenance and Plant Operations of Owner prior to commencement of the Work. Said certificates shall provide that the carrier must give Owner at least thirty (30) days prior written notice before cancellation or reduction of the coverage for any reason. If not covered by the above insurance, Contractor shall also purchase and maintain similar coverage on portions of the Work stored off site or in transit when such portions of the Work are to be included in an Application for Payment under Subparagraph 9.3.2. Until substantial completion of the Work, all risk of loss shall be upon Contractor."
- (f) Paragraph 11.3.4 is eliminated.
- (g) Paragraph 3.6.1 is amended by adding the following "Contractor assumes full responsibility for the payment of all contributions and payroll taxes (State and Federal) for all employees engaged on the Work and provide proof of worker compensation coverage for all employees."

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**END OF SECTION 000110**

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# **PROJECT MANUAL**

October 20, 2022

## **Secure Entry & Facade at Memorial High School**

### **BID PACKAGE**

**BIDDING DOCUMENTS  
PROJECT SPECIFICATIONS**

**INDEPENDENT SCHOOL DISTRICT NO. ONE  
TULSA OKLAHOMA**

**Chris Hudgins, Executive Director Bond Projects  
Charles C. Mason Education Service Center  
3027 South New Haven  
Tulsa, Oklahoma 74147-0208  
Telephone (918) 746-6684, Fax Number (918) 746-6597**



**TULSA PUBLIC SCHOOLS**

**BID DOCUMENTS**

**SPECIFICATIONS AND DETAILS**

**For**

**Secure Entry & Facade**

**at**

**Memorial High School**

**BID OPENING DATE ..... November 8, 2022**

**BID TIME ..... 2:00 PM**

**NOTICE TO BIDDERS**

**Before submitting a bid, the Contractor shall carefully examine each of the school sites indicated above, paying particular attention to the existing conditions.**

**The specific bid documents defining the work involved on each project along with Tulsa Public Schools' specifications and details form the basis of the work done and are to be included with the successful bidder.**

**PROJECT MANUAL**  
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THE FOLLOWING DOCUMENTS ARE NOT FOUND IN THE PROJECT MANUAL BID PACKET BUT ARE REQUIRED TO BE A PART OF THE CONTRACT – ON FILE AT OWNER'S OFFICE FOR BIDDER'S INSPECTION UPON REQUEST.

Owner-Contractor Agreement  
Work Order  
Tax Exempt State

**SECTION 00010  
SOLICITATION AND NOTICE FOR BIDS**

Sealed Bids in duplicate for **TULSA PUBLIC SCHOOLS – SECURE ENTRY & FAÇADE AT MEMORIAL HIGH SCHOOL** will be received and publicly opened and read aloud by INDEPENDENT SCHOOL DISTRICT NUMBER ONE OF TULSA COUNTY, OKLAHOMA, hereinafter referred to as “Owner,” in Rm 457, Education Service Center, 3027 S. New Haven Ave, Tulsa, OK, 74114 until **2:00 PM, NOVEMBER 8, 2022.**

The bidding process will be in compliance with the Public Competitive Bidding Act of 1974. Bids must be accompanied by a bid security in the amount of 5% of the bid. By this notice, all provisions of the act apply to this project and are incorporated into notice by reference.

Upon receipt of an acceptable bid, the contract will be awarded within thirty days after the opening of bids and the written contract executed within sixty days thereafter.

Contractor qualification statement must be submitted **seven (7)** calendar days prior to bid date to the Owner, if not currently on file.

Attention is called to the fact that a designated completion date for this project site will be established based on the number of calendar days, as stated in the accepted bid, required to complete the Project work. There will be a \$2500 Liquidated Damages Clause for each day the contract is not completed. The scheduled completion date will be a very significant and material factor to the owner when selecting the Lowest Responsible Bid. Each Bidder must include (in the space provided on the Bid Form) the number of calendar days, which the Bidder will require to complete the specified Project.

Failure to comply with the above bid requirements will result in return of unopened Bid Proposal.

Construction Manager on this project is Trigon General Contractors & Construction Managers, Inc.

Architect on this project is GH2 ARCHITECTS LLC

Bid Documents may be obtained from:

<http://www.tulsaschools.org/connect-with-us/partner-with-us/bond-bids>

Owner reserves the right to reject any or all bids and to waive informalities or minor irregularities in any bid.

INDEPENDENT SCHOOL DISTRICT NUMBER ONE OF TULSA COUNTY OKLAHOMA

By Ms. Stacey Woolley, Board President

ATTEST:

By Sarah Bozone, Clerk

## SECTION 00020

### INSURANCE REQUIREMENTS

Contractor shall obtain insurance of the types and in the amounts described below. The insurance shall be written by insurance companies and on forms acceptable to Owner.

#### **1). Commercial General and Excess Liability or Umbrella Liability Insurance:**

Contractor shall maintain commercial general liability (CGL) and, if necessary, commercial excess liability or umbrella insurance with a limit of not less than 1,000,000 each occurrence. CGL insurance should contain a general aggregate with a 2,000,000 limit and should apply separately to the Project.

- a) CGL insurance shall be written on an ISO occurrence form and shall cover liability arising from premises, operations, independent contractors, at a minimum, contractual liability equivalent to an intermediate form of contractual liability insurance, products/completed operations and personal injury and advertising injury.
- b) Owner shall be included as an additional insured on the CGL policy, using ISO Additional Insured Endorsement CG 20101185 or a substitute providing equivalent coverage, and under the commercial excess liability or umbrella, if any. This insurance, including insurance provided under the commercial excess liability or umbrella, if any, shall apply as primary insurance with respect to any other insurance or self insurance programs afforded to or maintained by Owner.
- c) There shall be no endorsement or modification of the CGL policy limiting the scope of coverage for liability arising from pollution, explosion, collapse or underground property damage.
- d) **Waiver of Subrogation.** Contractor waives all rights against Owner and its agents, officers, directors and employees for recovery of damages to the extent these damages are covered by the commercial general liability, excess liability or umbrella liability insurance maintained pursuant to this agreement.

#### **2). Business Auto and Excess Liability or Umbrella Liability Insurance:**

Contractor shall maintain business auto liability and, if necessary, excess liability or umbrella liability insurance with a limit of not less than 1,000,000 each accident.

- a) Such insurance shall cover liability arising out of any auto (including owned, hired and non-owned autos).
- b) Business auto coverage shall be written on an ISO form. If necessary, the policy shall be endorsed to provide contractual liability coverage equivalent to that provided in the 1990 and later editions of CA 00 01.
- c) If the Contract Documents require Contractor to remove and haul hazardous waste from the project site or if the Project involves such similar environmental exposure, pollution liability coverage equivalent to that provided on the ISO Pollution Liability Broadened Coverage for Covered Autos Endorsement (CA 99 48) shall be provided, and the Motor Carrier Act Endorsement (MCS 90) shall be attached.

- d) **Waiver of Subrogation.** Contractor waives all rights against the Owner and its agents, officers, directors and employees for recovery of damages to the extent these damages are covered by the business auto liability, excess liability or umbrella liability insurance obtained by Contractor pursuant to this Agreement or under any applicable auto physical damage coverage.

### **3). Workers Compensation Insurance**

Contractors shall maintain workers compensation and employer's liability insurance.

- a) The employer's liability, and if necessary excess liability or umbrella insurance limits shall not be less than 1,000,000 each accident for bodily injury by accident or 1,000,000 each employee for bodily injury by disease.
- b) The alternate employer endorsement (WC 00 03 01 A) shall be attached showing Owner in the schedule as the alternate employer.

### **4). Property Insurance**

- a) Contractor shall purchase and maintain in force Builders Risk insurance for the entire Work. Such insurance shall be written in an amount at least equal to the initial contract sum as well as subsequent modifications of that sum. The insurance shall apply on a replacement cost basis and shall be written on a completed value form.
- b) The insurance as required in subparagraph (a) shall name as insured the Owner, Contractor and all subcontractors and sub-subcontractors on the Project. The insurance policy shall contain a provision that the insurance will not be canceled or allowed to expire until at least 30 days prior written notice has been given to the Owner.
- c) The insurance as required in Subparagraph (a) shall cover the entire Work as outlined in the project specifications and shall also cover portions of the Work located away from the site but intended for use at the site and shall also cover portions of the Work in transit. The policy shall include as insured property scaffolding, false work and temporary buildings located at the site. The policy shall cover the cost of removing debris, including demolition, as any is made legally necessary by the operation of any law, ordinance or regulation.
- d) The insurance as required by this Paragraph shall be written to cover all risks of physical loss except those specifically excluded in the policy and shall inure at least against the perils of fire, lightning, explosion, windstorm or hail, smoke, aircraft or vehicles, riot or civil commotion, theft, vandalism, malicious mischief and collapse.
- e) Any deductible applicable to the insurance purchased in compliance with this Paragraph shall be paid by Owner.
- f) Before the commencement of Work, Contractor shall provide Owner a copy the insurance policy obtained in compliance with this Paragraph.
- g) **Waiver of Subrogation.** Owner and Contractor waive all rights against each other and each of their subcontractors, sub-subcontractors, officer, directors, agents and employees for recovery for damages caused by fire and other perils to the extent covered by builders' risk or property insurance purchased pursuant to the requirements of this Paragraph 4 or any other property insurance applicable to the Work.

- h) Partial occupancy or use of the Work shall not commence until the insurance company or companies providing insurance as required in this Paragraph have consented to such partial occupancy or use. Owner and Contractor shall take reasonable steps to obtain consent of the insurance company or companies and agree to take no action, other than upon mutual written consent, with respect to occupancy or use of the Work that could lead to cancellation, lapse or reduction of insurance.

#### **5). Evidence of Insurance**

Prior to commencing the Work, Contractor shall furnish Owner with a certificate(s) of insurance, executed by a duly authorized representative of each insurer, setting out compliance with the insurance requirements set forth above.

- a) All certificates shall provide for 30 days written notice to Owner prior to the cancellation or material change of any insurance referenced to herein.
- b) The words "endeavor to" and "but failure to mail such notice shall impose no obligation or liability of any kind upon the company, its agents or representatives" shall be deleted from the cancellation provision of all certificates provided by the Contractor.
- c) Failure of Owner to demand such certificate or other evidence of full compliance with these insurance requirements or failure of Owner to identify a deficiency from evidence that is provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- d) Owner shall have the right, but not the obligation to prohibit Contractor or any subcontractor from entering the Project site until such certificates or other evidence that insurance has been placed in the complete compliance with these requirements is received and approved by the Owner.
- e) Failure to maintain the insurance in this Insurance Requirement Section shall constitute an event of default pursuant to this Agreement and shall allow Owner to terminate this Agreement to Owner's option. If Contractor fails to maintain the insurance set forth herein, Owner shall have the right, but not the obligation, to purchase said insurance at Contractor's expense.
- f) Contractor shall provide certified copies of all insurance policies required above within 10 working days of Owner's written request for said copies.

#### **6). General Insurance Provisions**

- a) No Representation of Coverage Adequacy. By requiring the insurance as set out in the Insurance Requirement Section, Owner does not represent that coverage and limits will necessarily be adequate to protect Contractor and such coverage and limits shall not be deemed as a limitation on Contractor's liability under the indemnities provided to Owner in this Agreement or any other provision of the Contract documents.
- b) Cross Liability Coverage. If Contractor's liability policies do not contain the standard ISO separation of insureds provision or a substantially similar clause, they shall be endorsed to provide cross liability coverage.

- c) The insurance requirements set out in this Insurance Requirement Section are independent from all other obligations of Contractor under this Agreement and apply whether or not required by any other provision of this Agreement.
- d) Subcontractor's Insurance. Contractor shall cause each subcontractor employed by Contractor to purchase and maintain insurance of the type specified in the Insurance Requirement Section. When requested by the Owner, Contractor shall furnish to Owner copies of certificates of insurance evidencing coverage for each subcontractor.

**END OF SECTION**

## 2. **DEFINITIONS:**

Wherever the words herein defined, or pronouns used in the stead, occur in this contract and these specifications, they shall have the meanings herein given.

(a) The word "OWNER" shall mean the Independent School District Number One of Tulsa County, Oklahoma, a public corporation.

(b) The word "CONTRACTOR" shall mean the person, persons, Partnership, company, firm or corporation entering into the contract for the performance of the Work, and the legal representative of said party, or agent appointed to act for said party in the performance of the Work.

(c) The word "SURETY" or "SURETIES" shall mean the bondsman or party of parties who have made sure the fulfillment of the requirement of the contract by bonds, including the Payment Bond, and whose signatures are attached to said bonds.

(d) The word "ADVERTISEMENT" shall mean all of the legal publications pertaining to the Work.

(e) The word "SPECIFICATIONS" shall mean, collectively, all of the terms and stipulations contained in those portions of the contract known as Instructions to Bidders, General, Mechanical and Electrical Specifications.

(f) The word "PLAN" shall mean, collectively, all of the drawings pertaining to the contract and made part thereof, and also such supplementary drawings as may be issued from time to time in order to elucidate the drawings or for the purpose of showing changes in the Work as authorized under the section "Changes and Alterations," or for showing details which are not shown thereon.

(e) The words "CONTRACT PRICE" shall mean either the unit prices or unit price, or lump sum price, named in the contract or the total of all payments according to schedule or prices in the contract, as the case may be.

(h) The word "BID" or "BIDS" shall mean the written statements duly filed with the Clerk of Independent School District Number One of Tulsa County, Oklahoma, for the person or persons, partnership, company, firm or corporation proposing to do the Work and furnish materials called for on plans at the prices named on said statement.

(i) The word "CALENDAR DAYS" shall mean the actual days to complete the contract excluding days due to inclement weather.

## 3. **BONDS:**

If the Contract Price is in excess of **\$50,000.00**, Contractor will furnish the following bonds: (i) a Payment Bond (the "statutory" bond required by Section I of Title 6 1, Okla. State, as amended) in an amount equal to 100% of the Contract Price; and (ii) a Performance Bond in such form as directed by Owner in an amount equal to 100% of the Contract Price for work on the project(s) as security for the proper and prompt completion of the Work in accordance with the contract and bidding documents; and (iii) a Warranty Bond in an amount equal to 100% of the Contract Price



for work on the project(s) to protect Owner against defects in workmanship and materials for a period of one (1) year from Owner's acceptance of the Project(s). The Surety on all bonds of the successful bidder must be approved in the Treasury Department Circular 570. If the Surety Company is not on the list, those bids shall be rejected.

Where the Contract Price is **\$50,000.00** or less, the above bonds will not be required. However, in lieu of the Payment Bond, as to contracts where the Contract Price is 25,000.00 or less, Contractor shall submit an affidavit of the payment of all indebtedness incurred by the Contractor, Subcontractors, and all material men for labor, material, rental of machinery or equipment and repair of and parts for equipment as are used or consumed in the performance of the contract. The execution of the affidavit with knowledge that any of the contents of the affidavit are false, upon conviction, shall constitute perjury, punishable as provided by law. Copies of the affidavit form may be obtained from the Facilities Bond Office Room 201 South, Charles C. Mason Education Service Center, 3027 South New Haven Avenue, Tulsa, Oklahoma, 74147.

**4. CORPORATE SURETY BONDS:**

To be acceptable, a corporate surety bond (including both a bid bond and the payment/performance/warranty bonds of the successful bidder) must be signed by BOTH the bidder, as principal, and by a properly authorized representative of the bonding company. If the bonding company is a corporation, the bond must have attached a power of attorney from the corporation authorizing the person signing the bond on behalf of the bonding company to sign bonds for the bonding company. Only original executed instruments will be acceptable.

The corporate surety issuing the bond must be licensed by the Oklahoma State Insurance Commissioner to issue corporate surety bonds in the State of Oklahoma. The Owner reserves the right to require the bidder to submit evidence that the corporate Surety Company is so authorized. The Corporate Surety on all bonds of the successful bidder must be approved in the Treasury Departments Circular 570. If the Surety Company is not on the list, those bids shall be rejected. A bond written by an "offshore" (non-United States) surety company will not be acceptable.

**5. SPECIFICATIONS REGARDING EQUALS:**

It is not the intent of these documents to have closed specifications and the brand names shown are the desired materials to be used. The name of a certain brand makes, or manufacturer does not restrict proposals to the specified brand, make or manufacturer named unless a brand, model or manufacturer is labeled "No Substitution" in the bid. It is not intended to exclude other products, but to convey the type, functional characteristics and quality of the item desired. Any item that the Owner, in its sole discretion, determines and approves to be the equal of that specified considering quality, workmanship, economy of operation and suitability for the purpose intended will be considered. Thus "equal" products of other manufacturers may be considered if the products meet or exceed the stated specifications, and if a detailed explanation of a claim of equivalency is submitted five (5) days prior to the bid opening. It will be the responsibility of the Bidder to provide data on all products so that the Owner can compare.

**6. COMPLETION:**

Upon completion of the project, the Contractor will notify Owner and Owner's Representative will make a final inspection of the work. The project shall be completed in good and workmanlike manner and to the satisfaction of the Owner.

**7. ETHICS IN PUBLIC CONTRACTING:**

By submitting their bid, Bidders certify that their bids are made without collusion or fraud and that they have not offered or received any kickbacks or inducements from any other bidder, supplier, manufacturer or subcontractor in connection with their proposal, and that they have not conferred

on any public employee having official responsibility for this procurement transaction any payment, loan, subscription, advance, deposit of money, services or anything of more than nominal value, present or promised unless consideration of substantially equal or greater value was exchanged.

**8. NON-DISCRIMINATION:**

Contractor agrees Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, age, or national origin. Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, age or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff-, or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting for the provisions of this non-discrimination clause.

**9. ERRORS OR OMISSIONS:**

The Bidder shall not be allowed to take advantage of any errors or omissions in the specifications. Where they occur, the Bidder shall promptly notify the contact person listed. Inconsistencies in the specifications are to be reported before bids are submitted.

**10. BID FORM:**

The bid MUST be submitted on the bid form provided in the bid packet. A Xerox copy of this bid form is acceptable. All blanks must be completed.

**END OF SECTION**

## SECTION 000110

### SPECIAL CONDITIONS OF THE CONTRACT

The following conditions also apply to this contract:

1. **WORK COVERED UNDER THE CONTRACT:**

The scope of the work consists of all new materials, tools, equipment, labor and services, to complete the **SECURE ENTRY & FACADE AT MEMORIAL HIGH SCHOOL** listed in the "Solicitation and Notice for Bids" in accordance with the "Form of Proposal" and as indicated by the Drawings and by the Specifications included in this Project Manual.

2. **MATERIALS AND EQUIPMENT:**

All material and equipment utilized shall be in conformance with these Specifications and with good Standards of practice and shall meet or exceed the latest applicable industry standards such as A.S.T.M., Standards and Specifications along with all applicable local and national codes and ordinances, including B.O.C.A, N.E.C. and N.F.P.A.

Failure to comply with the terms and conditions of this solicitation or to deliver equipment, supplies or services identified in the Solicitation and Contract at the discount quoted will void the contract award. In the case of failure to deliver goods or provide services in accordance with the contract terms and conditions, Owner, after due oral or written notice, may procure them from other sources and hold the contractor responsible for any resulting additional purchase and administrative costs.

3. **CONTRACT METHOD:**

The method of Contract and Management shall be in accordance with the Owner's requirements and guidelines set forth at the time the Contract is signed, and a Work Order issued.

4. **CONTRACT ADMINISTRATOR:**

This individual shall serve as the monitor of the conditions of the contract and shall work directly with the contractor to schedule and coordinate the performance of services and to provide general direction under the resulting contract. The following individual is identified to use all powers under the contract to enforce its faithful performance for the Owner: **Chris Hudgins**, Project Supervisor, (918) 746-6684.

5. **PRIORITIES AND WORK SEQUENCE:**

The priority will be furnished by the Owner to the successful bidder at the Issuance of the Work Order. Completion of the project(s) in a timely manner is critical. The bidder is required to give the actual number of days to complete each project. Timing will be a consideration in determining the successful bidder.

6. **CONTRACTOR'S USE OF PREMISES:**

The contractor shall also furnish a schedule of intended workdays to the owner through the Department of Building Planning prior to commencing the work at any site and keep all

parties informed of any adjustments made necessary by changes of shipping schedules or other causes.

Permission must be obtained from the Owner for temporary use of electric power, water, toilet facilities or other utilities. The Owner's approval must also be obtained for the exact on-site location of any storage of materials, tools or equipment. Owner assumes no responsibility for items stored on school property.

Demolition items and/or debris shall be hauled away from the site after each day's activity and the site always maintained in a clean condition free of any build-up of objectionable scraps, waste material or refuse.

**7. OWNER OCCUPANCY AND PROTECTION OF PROPERTY:**

The owner's Site-based Personnel may occupy the site. Therefore, it may be necessary to erect a system of barricades or markers to direct traffic away from the area of each day's operations. The Contractor shall protect and safeguard against damage to all adjacent or nearby surfaces, materials, hardware, glass, furnishings, signage or other site improvements and/or vehicles if in the area of intended loading and unloading operations.

**8. SALES TAX: (None Required)**

The Owner will issue such Documents as necessary to exempt the sales tax upon execution of a contract for the Project(s); therefore, the Contractors are advised to omit the State Sales Tax when preparing their Bid.

**9. PROJECT START-UP:**

The contractor is advised to notify the Owner well in advance of commencing the work on the site.

**10. KNOWLEDGE OF SITE AND SCOPE OF WORK REQUIREMENTS:**

All Contractors shall visit the site on which work is proposed and become thoroughly familiar with the existing conditions and with the Bid Documents and the Scope of the Work included prior to submitting their bid. Sign in at the main office when visiting the site(s).

**11. SUBMITTALS AND CLOSING PROCEDURES:**

(Other than Start-up Contract Requirements such as Certificates of Insurance, Bonds, Etc.)

A. Submit Schedules of intended workdays and activity planned for each Site after receiving Owner's Project Priority list prior to commencing work. **Shop drawings and/or product data and samples** shall be submitted to Tulsa Public Schools' Building Planning department covering all Items in the Scope of Work **for approval prior to manufacture** shipment and installation at the project site. Submit the number of copies, which the contractor requires plus one copy, which will be retained by Tulsa Public Schools' Building Planning Department. Furnish information on characteristics of finish materials proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the architect in writing of any anticipated problems using specified coating systems with substrates primed by others.

B. Unless the contract stipulates "Payment upon Completion" of the project or another method of payment; during Progress of the work, submit a separate "Application and Certificate for Payment"-AIA Document G702 on or about the 25<sup>th</sup> day of each month for

work performed in that same month. A 10% retainage shall be calculated and withheld from each Pay Application until the project is completed and accepted by Owner.

C. Upon Final Completion and Final Acceptance by Owner, submit the following prepared and properly signed Closing Documents:

1. Certificate of Substantial Completion  
(AIA Document G704)
2. Final Application and Certificate for Payment  
(AIA Document G702)
3. Contractor's Affidavit of Payment of Debts  
and Claims (AIA Document G706)
4. Contractor's Affidavit of Release of Liens  
(AIA Document G706A)
5. Consent of Surety Company to Final Payment  
(AIA Document G707)
6. Contractor's Affidavit Pursuant to Title 61  
O.S.- Optional in lieu of items 3 above.
7. Contractor's Written Warranty for one (1) year against defects in Material or  
Workmanship.

**12. SUBSTITUTIONS AND DEVIATIONS FROM THE SPECIFICATIONS:**

Substitutions prior to Bid are covered under Paragraph 6 "Instructions to Bidders". Any substitution or deviation from the specifications must be by Owner's prior approval and accepted by an approved change order stipulating the change in price and change in construction time, if any.

**13. OWNER'S RIGHT TO REJECT BIDS:**

The Owner reserves the right to reject any or all bids and to waive minor irregularities in any bid. In addition, Bidders should recognize the right of the Owner to reject a bid if said bidder fails to provide any data required in the bid or if the bid is in any way incomplete.

**14. FINAL CLEANING:**

- A. Execute prior to final inspection.
- B. Clean surfaces exposed to view; remove temporary labels, stains and foreign substances and polish transparent and glossy surfaces. Clean equipment and fixtures, sweep and vacuum interior areas and rake clean exterior areas. Remove waste and surplus materials, rubbish and construction facilities from the Project and from the site.

**15. SPECIAL TERMS AND CONDITIONS:**

- 15.1 Testing and Inspections: Owner reserves the right to conduct any test or inspection it may deem advisable to assure supplies and services conform to specifications.
- 15.2 Proprietary Indemnity: Bidder warrants that the system, each part of the system, and all other products and services used by or furnished by bidder, do not infringe upon or violate any patent, copyright, trade, secret, trademark, or any other proprietary right of any third party. In the event of claim against Owner, Owner shall promptly notify vendor and vendor shall defend and indemnify Owner against any loss, cost expense, claim, or liability arising out of such claim, whether or not such claim is successful.
- 15.3 Patent and Copyright Materials: Unless otherwise expressly provided in a contract, bidder shall be solely responsible for clearing the right to use any patented or copyrighted materials in the performance of this contract.
- 15.4 Audit: Contractor hereby agrees to retain all books, records and other documents relative to this contract for five (5) years after final payment or until audited by the owner, whichever is sooner. Owner, its authorized agents and/or auditors reserve the right to perform or have performed an audit of contractor's records and therefore shall have full access to the right to examine any of said materials within those five years.
- 15.5 Open Records: Ownership of all data, materials and documentation originated and prepared for the owner pursuant to this bid shall belong exclusively to Owner and be subject to inspections in accordance with the Oklahoma Open Records Act.
- 15.6 Contractor Compliance: Contractor shall comply with all procedural instructions that may be issued from time to time by Owner; however, the terms and conditions of the contract will not change:
- 15.7 Lead Based Paint: Contractor shall be certified and follow work practices established under the UPA Renovation, Repairing and Painting Program applicable to schools when performing any work which will disturb interior or exterior lead-based surface coatings in buildings constructed before 1978. All such work shall be performed in compliance with 40 CFR Part 745.

**END OF SECTION**

## SECTION 000120

### SUPPLEMENTAL CONDITIONS TO THE CONTRACT

(References are to Articles, Paragraphs, Subparagraphs and Clauses of the General Conditions of the Contract for Construction, AIA Document A201, 1997 Edition)

4.3.1 **Delete** entire Subparagraph, and substitute the following:

#### "Definition"

"A Claim is any demand or assertion by the Contractor that it should be paid more money than the Contract Sum, as adjusted under the Change Order provisions herein, by the Owner because of action or inaction on the part of Owner, Program Manager, Architect, or any party for whom Owner is responsible, or any party with whom Owner has separately contracted for other portions of the Project, including, but not limited to, any demand or assertion that Contractor's performance has been delayed, interrupted or interfered with, that Contractor's performance has been accelerated or suspended, that Contractor's performance has been wrongfully terminated, that the Contract Documents have been misinterpreted, that there has been a failure of payment, that Contractor has encountered concealed or unknown conditions, that Contractor has encountered hazardous materials, that there are problems with the Contract Documents, or the timing of Architectural approvals or decisions, that actions of the Owner have been intentionally wrongful or deceptive, that Owner is directly or indirectly guilty of negligence or an intentional tort related in any way to the Work, that the amount of time or money granted in a Construction Change Directive is inadequate, that an item treated as a minor change in the Work should have been treated as a Change Order, that a time extension grant was inadequate, or that Contractor is entitled to any other relief, on any legal theory, related to the Work and the Contract."

#### "Notice Requirement"

"Within five (5) days of the first occurrence of an event that Contractor has any reason to believe might result in a Claim, or within five (5) days of Contractor's discovery of the first occurrence of an event that Contractor has any reason to believe might result in a Claim, if the first occurrence of the event was willfully hidden from the Contractor, the Contractor shall file a written document clearly captioned "Notice of Claim" with Tulsa Public Schools, Program Manager and the Architect. The notice shall clearly set out the specific matter of complaint, and the impact or damages which may occur or have occurred as a result thereof, to the extent the impact or damages can be assessed at the time of the notice. If the impact or damages cannot be assessed as of the date of the notice, the notice shall be amended at the earliest date this is reasonably possible."

**Add** the following Subparagraph:

"Any claim or portion of a Claim that has not been made the specific subject of a notice strictly in accordance with the requirements of this section shall be waived. It is imperative that Owner have timely, specific notice of any subject, the impact of which Owner may be in a position to mitigate."

4.3.3 **Add** the following sentences:

"Claims Handling During Construction. After receipt of a Notice of Claim, the Owner may elect to refer the matter to the Architect, Program Manager or another party for review. Contractor will attend meetings called to review and discuss the Claims and mitigation of the problem and shall furnish any reasonable factual backup for the Claim requested. The Owner may also elect to defer consideration of the Claim until the Work is completed, in which case the same review options shall be available to the Owner at the completion of the Work. At any stage the Owner is entitled to refer a Claim to mediation under the Construction Industry Mediation Rules of the American Arbitration Association, and if this reference is made Contractor and the Owner will take part in the mediation process. The filing, mediation or rejection of a Claim does not entitle Contractor to stop performance of the Work. The Contractor shall proceed diligently with performance of the Contract."

4.3.6.1 **Add** the following Subparagraph:

"Calculating Claim Amount"

"In calculating the amount of any Claim, the following standards will apply:

- .1 No indirect or consequential damages will be allowed.
- .2 All damages must be directly and specifically shown to be caused by a proven wrong. No recovery shall be based on a comparison of planned expenditures to total actual expenditures, or on estimated losses of labor efficiency, or on a comparison of planned man loading to actual man loading, or any other analysis that is used to shown damages indirectly.
- .3 Damages are limited to extra costs specifically shown to have been directly caused by a proven wrong.
- .4 The maximum daily limit on any recovery for delay shall be the amount estimated by the Contractor for job overhead costs divided by the total number of calendar days of Contract Time called for in the original Contract."
- .5 No monetary costs shall be allowed for delay.

5.2.1 In the first sentence, delete "as soon as practicable" and substitute "within seventy-two (72) hours."

5.2.5 **Add** this new Subparagraph:

"The Contractor shall not sublet the work as a whole. The approval of Subcontractors in no way relieves the Contractor from full responsibility for performance and completion of the Work and its obligations under the Contract Documents."

5.3.1 **Delete** the remainder of the second sentence beginning with the words "and shall allow to the Subcontractor."

5.4.2 **Delete** entire Subparagraph and substitute the following:

TPS Memorial Highschool -  
New Facade and Secure  
Entry  
20210120.01

000120 - 2

Supplemental Conditions of  
the Contract  
10/20/2022



"Owner shall only be responsible for compensating Subcontractors for work done or materials furnished after the date Owner gives written notice of its acceptance of the subcontract agreement."

5.5 **Add** this new Paragraph:

5.5 "RESPONSIBILITY"

5.5.1 "Contractor shall be fully responsible for the performance of its Subcontractors."

6.1.1 **Delete** the entire Subparagraph, and substitute the following:

"The Owner reserves the right to perform other construction work, maintenance and repair work and school program operations at the site and near the site during the time period of the Work. Owner may perform other work with separate contractors or with its own forces. On renovation/addition projects, the Owner shall have access to the site and all buildings on the site at all times. On new construction, the Owner shall have access to the site and all buildings during normal business hours."

10.1.2 **Add** this new Subparagraph:

"The Contractor shall be responsible for the protection and security of the Work and the Project, until he receives written notification that the Substantial Completion of the work has been accepted by the Tulsa Public Schools."

10.2.8 **Add** this new Subparagraph:

"In an emergency affecting the safety of persons or property, the Contractor shall notify the Owner, Program Manager and Architect immediately of the emergency, simultaneously acting at his discretion to prevent damage, injury, or loss. Any additional compensation or extension of time claimed by the Contractor on account of emergency work shall be determined as provided in Article 4.3 and Article 7."

10.3.1 **Delete** entire Subparagraph and substitute the following:

"Contractor is responsible for reviewing all Asbestos Hazard Emergency Act Management Plans on file with Owner and for obtaining sign-off from Tulsa Public Schools Hazardous Materials Bureau prior to commencing the Work. In no event shall the Contractor engage in the disturbance or removal of asbestos or polychlorinated biphenyl (PCB). In the event the Contractor encounters on the site material reasonably believed to be asbestos or PCB which has not been rendered harmless, the Contractor shall immediately stop work in the area affected and report the condition to the Architect in writing. If the portion of the Work that is stopped is critical to overall completion, the Contractor shall reschedule the Work, if possible, to minimize the impact of the stoppage. The work in the affected area shall not thereafter be resumed except by written agreement of the Owner and Contractor if in fact the material is asbestos or PCB and has not been rendered harmless. The work in the affected area shall be resumed when the asbestos or polychlorinated biphenyl (PCB) has been removed, or when it has been rendered harmless. If the Work is stopped due to the

presence of such materials, Owner shall arrange for the removal and/or rendering harmless of such materials prior to Contractor being allowed to proceed. The Owner shall have the option of arranging for removal by a qualified, adequately insured third party tendered to Contractor, and mutually agreed to by both parties, as a Subcontractor in which case a Change Order will be issued for the cost of this subcontract. Any tendered Subcontractor must indemnify the Contractor and the Owner with regard to its work. In the case of such a tender, Owner will not hold Contractor responsible for the work or other actions of the tendered Subcontractor, and Contractor's approval of tendered Subcontractor shall not be unreasonably withheld. In those instances, in which the presence of such materials was set forth in the Hazardous Materials documents or in which Contractor had other notice of such through information given to Contractor by Owner or its representative prior to the commencement of the Work, Contractor shall not be entitled to a Claim for any delays, disruption or interference it encounters. In those instances of work stoppage due to the existence of such hazardous materials which were not set forth in the Hazardous Materials Control plans and of which Contractor had no other prior notice, Contractor may be entitled to a Claim for extension of time due to the work stoppage."

## 11.4 PROPERTY INSURANCE

### 11.4.1 **Delete** entire Subparagraph, and substitute the following:

"Until the Work is completed and accepted by the Owner, the Contractor shall purchase and maintain property insurance upon the entire Work at the site to the full insurable value thereof. The property insurance shall also cover portions of the Work stored off site after written approval of the Owner of the value established in the approval, and also portions of the Work in transit. This insurance shall include the interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Work and shall insure against the perils of fire and extended coverage including flood and earthquake and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, theft, vandalism and malicious mischief. The insurance shall cover reasonable compensation for Architect's and Program Manager's services and expenses required as a result of an insured loss. This "all risk" policy shall be written incorporating Actual Completed Value Form and General Change Endorsement incorporating the following language:

*"Permission is given for the Project insured hereunder to become occupied, the insurance remaining in full force and effect until such time as the Project has been accepted by the Owner, all as currently approved by the Laws for the State of Oklahoma."*

"The policy shall include coverage for Explosion, Collapse and Underground (XCU). Such insurance shall be evidenced by the kind of policy which does not have to be adjusted or reported upon periodically but provides constant insurance at full one hundred percent (100%) of all insurable values as they are created during construction by performance of the Contract. The Certificate of Insurance must include the names of the insured Contractor and the Tulsa Public Schools."

### 11.4.1.2 **Delete** entire Clause, and substitute the following:

"Loss under such All-Risk Builder's Risk Insurance shall be made payable jointly to the Tulsa Public Schools and to the Contractor by name (and, if separate mechanical contracts are awarded to each, by name, of the plumbing, heating, ventilating and electric contractors)."

11.4.1.3 **Delete** entire Clause, and substitute the following:

"In the case of loss under the risks covered, and of collection by insured, the Owner shall act as trustee for all parties concerned as their interests may appear."

12.1.3 **Add** this new Clause:

"Where nonconforming work is found, the entire area of work involved shall be corrected unless the contractor can completely define the limits to the Architect's satisfaction. Additional testing, sampling, or inspecting needed to define nonconforming work shall be at the Contractor's expense. He shall employ the Owner's testing laboratory if such services are reasonably required by the Architect. All connected work shall be retested at the contractor's expense. Extra Architectural or Program Manager Services required to analyze nonconforming work shall be paid for by the Contractor."

13.1.1 **Delete** entire Subparagraph, and substitute the following:

"District Court in and for the County of Tulsa, State of Oklahoma shall have sole jurisdiction in any action brought under this contract."

14.2.5 **Add** this new Subparagraph:

"If a Performance Bond has been furnished and the Contractor is declared by the Owner to be in default under the Contract, the Surety shall promptly remedy the default by completing the Contract in accordance with its terms and conditions, or by obtaining a bid or bids in accordance with its terms and conditions. Upon determination by the Owner and the Surety of the lowest responsible bidder, the Surety will arrange for a contract between such bidder and the Owner and make available as work progresses sufficient funds to pay the cost of completion less the balance of the Contract Sum, but not exceeding the Penal Sum of the bond and other costs and damages for which the Surety may be liable under the bond. The phrase 'balance of the Contract Sum' as used herein shall mean the total amount payable by the Owner to the Contractor under the Contract and amendments thereto less the amount previously paid by the Owner to the Contractor."

**END OF SECTION**

**BID PACKAGE**

# FORM OF PROPOSAL

For

Secure Entry & Facade

At

Memorial High School

**BID OPENING AT 2:00 PM, TUESDAY, November 8, 2022**

.....

CONTRACTORS WILL NOTE THAT A PROPOSAL MUST BE MADE ON THIS FORM. OTHER PROPOSALS WILL NOT BE ACCEPTED. COMPLETE ALL BLANKS. ALL BID PRICES SHALL BE IN BOTH FIGURES AND IN WRITING. PROPOSALS SHALL BE ENCLOSED IN A SEALED ENVELOPE, MARKED ON THE OUTSIDE “**SEALED BID: SECURE ENTRY & FACADE AT MEMORIAL HIGH SCHOOL. ALSO INCLUDE COMPANY NAME, ADDRESS & PHONE NUMBER**”

Selection of the successful bidder will be based on the lowest responsible bid taking into consideration the number of calendar days bid to reach substantial completion of the Work. The Owner reserves the right to reject any or all bids and to waive informalities and minor irregularities in any bid.

Independent School District Number One of Tulsa County, Oklahoma  
Charles C. Mason Education Service Center  
3027 South New Haven  
Tulsa, Oklahoma 74147-0208

Dear School Board Members:

The undersigned Contractor, in compliance with your Solicitation and Notice for Bids and Instructions to Bidders contained in the Bid documents for **Secure Entry & Facade at Memorial High School** in Tulsa, County, Oklahoma, having examined the Specifications, Drawings, details, and Scope of Work, and areas where the work is proposed, and being familiar with all of the work required at the Project site(s), hereby proposes to furnish all labor, materials, tools, equipment, supplies and services to complete the Project(s) within the time set forth in this Proposal for the price as herein stated. The price(s) indicated is to cover all expenses incurred in performing all of the work required under the Contract Documents of which this Proposal is a part.

If awarded a contract for the Projects the undersigned agrees as follows:

1. To furnish a Contractor's Written Warranty which will warranty the Project(s) for a period of one (1) year after substantial completion and acceptance by Owner against all defects in materials and workmanship.
2. To furnish all other insurance and Bonds required as indicated in the "Solicitation and Notice for Bids" in the amount equal to the Total Contract Price.
3. To furnish a monthly Application and Certificate for Payment (AIA Documents G702) and Certificate of Substantial Completion (AIA Document G704) for the project(s) based on the contract bid price indicated on this proposal.

The bidder acknowledges the following Addendum: \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

**OUR BID FOR COMPLETING THE REQUIRED WORK DEFINED ABOVE AND DESCRIBED IN THESE BID DOCUMENTS IS AS FOLLOWS:**

We have included the following sworn and notarized bid affidavits and bid security. They are attached to this proposal:

1. Bid Bond, Certified Cashier's Check or other approved security as listed in the "Solicitation and Notice for Bids" and "Instructions to Bidders," in the amount of five (5%) of the bid.
2. Non-Collusion Affidavits
3. Business Relationship Affidavit
4. Non-Discrimination Affidavit
5. Felony Statement
6. No Kick Back Statement

7. Contractor's Qualification Statement (**completed and submitted seven days prior to bid**)

In submitting this Bid, the undersigned agrees that the Bid will not be withdrawn for a period of thirty (30) calendar days from the date hereof and it is understood that the right is reserved by the Owner to reject any and all Bids and to waive informalities and irregularities.

Respectfully submitted

Seal if Bid is by  
Corporation

---

Company

---

By

---

Title

---

Address

---

City, State, Zip

---

Area Cide & Telephone Number

---

Company ID

---

**Note: When submitting your bid, all blanks on this form must be filled in.**

# MEMORIAL HIGH SCHOOL – NEW FAÇADE & SECURE ENTRY

## BID PACKAGE

## BIDDING REQUIREMENTS

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### Specification

Section	Description
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Divisions 0 & 1	General Requirements
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Bidders will include all work from specifications listed in bid package summary and other work normally associated with this trade whether referenced or not.

**The Scope of Work shall include, but is not necessarily limited to the following general items:**

- 1.) All submittals, shop drawings, samples and mock-ups required by the contract documents.
- 2.) Furnish all licenses and permits and arrange for inspections and required testing as may be required by and for this contractor's work.
- 3.) Protection of adjacent surfaces and repair of any damage caused by the work of the contractor.
- 4.) Contractor to provide manpower and equipment necessary, as required by the project schedule, and to provide additional crews, equipment, etc. and/or overtime required to maintain the schedule if contractor falls behind due to their own fault or due to inclement weather. Project is proposed to start 5-26-23 and to be completed 8-6-23.
- 5.) Contractor to provide for its employees all necessary safety railing and fall protection as required by the authorities having jurisdiction.
- 6.) Contractor to be responsible for field engineering, layout and field layout from benchmarks and base building control.
- 7.) Include all comebacks / remobilization operations relating to this work which is normal or is to be expected. Receiving, hoisting and materials transport for this scope of work.
- 8.) Temporary barricades, flagmen and traffic control as required.
- 9.) Pumping and dewatering as required for this scope of work.
- 10.) Saw cutting and patching, as required for completion of the work required by this scope of work.
- 11.) Provide drinking water for your employee's and your subcontractor's employees under this scope of work.
- 12.) Provide all shoring, bracing, scaffolding, work platforms, equipment and supplies to complete all work performed in this contract.
- 13.) Coordinate material deliveries with construction manager and provide employee to receive deliveries.
- 14.) Prepare in an acceptable format, and submit to construction manager, a job specific safety plan including written hazard analysis.
- 15.) Contractor shall perform daily clean up his work in such a manner as to maintain safe working conditions on the project, including but not limited to excess material, lunch trash and dirt and debris on streets and sidewalks. All trash generated from this contractor's work or forces shall be removed by contractors own forces and equipment for placement in on-site dumpster provided by others. Waste that requires special disposal such as concrete, pavement or hazardous waste will be disposed of by contractor and not placed in on- site dumpster. If after 24-hours notice contractor fails to clean-up trash, then Construction Manager may clean up and the cost thereof shall be charged to the contractor. Demo contractor to provide own dumpsters.
- 16.) Assist the owner's materials testing laboratory in obtaining samples and gathering data as needed.
- 17.) Laboratory materials testing shall be provided by others, however, any re-testing required due to failed initial testing due to the action of this contractor shall be paid by this contractor.
- 18.) Contractor shall attend weekly project coordination meetings while performing work on the site.
- 19.) Contractor will be expected to sign the form of agreement, and provide insurance as required in the project specification, insurance certificate shall be provided prior to starting work on-site.
- 20.) Coordinate location of existing utilities with the owner and construction manager.

The Scope of Work shall also include the following items, but without limiting the scope of work as provided above. **SEE BID PACKAGE SUMMARY FOR MORE INFORMATION ON EACH BID PACKAGE.**



# **MEMORIAL HIGH SCHOOL – NEW FAÇADE & SECURE ENTRY**

## **INDEX**

- 2A DEMOLITION**
- 3A CONCRETE**
- 5A STRUCTURAL STEEL**
- 7A METAL WALL PANELS**
- 7B TPO MEMBRANE ROOFING**
- 8A DOOR HARDWARE**
- 8B ALUMINUM STOREFRONT & GLAZING**
- 9A FRAMING, DRYWALL, & CEILINGS**
- 9B CEMENT PLASTERING**
- 9C FLOORING & TILE**
- 9D PAINTING**
- 26A ELECTRIC**
- 31A SITEWORK**

**NOTE: All specified items NOT specifically referenced to a bid package above, will be bid to Trigon, Inc. directly. Please drop off all bids or email to those items to: Trigon, 11345 E. 60<sup>th</sup> Pl., Tulsa, OK 74146 or [steven@trigoninc.com](mailto:steven@trigoninc.com) by 2:00 pm on Tuesday, November 8, 2022.**

### **\*\* SPECIAL NOTE \*\***

**Normal Work Day will be defined as 7:00 a.m. to 7:00 p.m., Monday thru Saturday. Your bid should be prepared with this in mind. Your company will be required to provide material, labor, and productivity necessary to meet the project schedule as established by the Construction Manager.**

# MEMORIAL HIGH SCHOOL – NEW FAÇADE & SECURE ENTRY

## BID PACKAGE SUMMARY SCOPE OF WORK

Division 0, 1 and Bidding Requirements are included in all Bid Packages  
BID PACKAGE #

**2A DEMOLITION 024100**

Scope of work to include, but not limited to, all interior and portion of exterior demolition per the construction documents. Bid to also include sawcutting as needed as well as removal of all existing walls, doors, ceilings, counters, millwork, flooring, resilient base, storefront, glazing, marker boards, tack boards, crown molding, abandoned wall mounted conduit, and any other items identified for removal. Exterior scope to include removal of existing signage and masonry on vertical walls. ALL demoed items shall be removed from site in demolition contractor provided dumpsters.

**3A CONCRETE 033000, 321313, 321373, 079200**

Scope of work to include, but not be limited to, all aggregate base, reinforcing steel, and concrete work with designated expansion and construction jointing per the construction documents. Bid to include installation of bollards and anchor bolts supplied by structural steel contractor. Bid shall also include light pole bases, architectural concrete, and planters.

**5A STRUCTURAL STEEL 051200, 053100, 055000**

Scope of work to include, but not be limited to, all structural steel, steel tube frames, lintels, and erection or installation work per the construction documents. Provide bollards for installation by others.

**7A METAL WALL PANELS 074213, 074213.23, 79200**

Scope of work to include, but not limited to, providing and installing a complete ACM panel system which includes all brackets, clips, flashings, and accessories as per the construction documents. Bid to also include architectural composite panel system on canopy section.

**7B TPO MEMBRANE ROOFING 075423, 076200, 077100, 077123, 079100, 79200**

Scope of work to include, but not limited to, providing and installing a complete membrane roofing system with all associated flashing, copings, sheathing, and accessories as per the construction documents. Bid to also include the metal soffit panel at the canopy section.

**8A DOOR HARDWARE 080671**

Scope of work to include supplying and delivering to site all Door Hardware per the construction documents.

**8B ALUMINUM STOREFRONT & GLAZING 084313, 088000, 79200**

Scope of work to include, but not limited to, providing and installing a complete storefront and glazing system including safety glass at the secure entry.

## **MEMORIAL HIGH SCHOOL – NEW FAÇADE & SECURE ENTRY**

- 9A      FRAMING, DRYWALL, AND CEILING                      054000, 092116, 095100, 79200**  
Scope of work to include, but not limited to, completing all interior and exterior metal framing, building insulation, sheathing gypsum board systems complete, control joints, finishing, and ceiling work per construction documents. Also to include firestopping in rated assemblies.
- 9B      CEMENT PLASTERING                      79200, 092400**  
Scope of work to include, but not limited to, providing and installing a complete cement plaster system as per the construction documents. Bid to include all necessary surface prep, flashings, and accessories.
- 9C      FLOORING & TILE                      090561, 096500, 096813**  
Scope of work to include, but not limited to, providing and installing all LVT, carpet, rubber base, and floor prep as per the contract documents. Bid to include all transitions and reducers needed to complete the project.
- 9D      PAINTING                      079200, 099113, 099123**  
Scope of work to include, but not limited to, providing interior and exterior painted systems as per the contract documents.
- 26A    ELECTRIC                      260400**  
Scope of work to include, but not limited to, providing and installing a complete interior and exterior electrical system and low voltage raceways according to the construction documents. Bid to include disconnection of all electrical items identified for removal by the demolition and/or sitework contractor. Also to include firestopping of penetrations through rated assemblies. Coordinate with the low voltage contractor for locations of all devices that require a pathway and junction boxes.
- 31A    SITEWORK                      311000, 312000, 312500**  
Scope of work to include, but not limited to, completion of site demolition and associated saw cutting, grading, storm sewer, gutter adapters, structural soil, and erosion control. Demolition to include planters, concrete sidewalk, curb, trees, benches, and lightpoles.

**MEMORIAL HIGH SCHOOL – NEW FAÇADE & SECURE ENTRY**

**CONTRACTOR AND SUPPLIER BID FORM**

Bidder:

Company Name \_\_\_\_\_

Phone \_\_\_\_\_

Address \_\_\_\_\_

Fax \_\_\_\_\_

City/ State/ Zip \_\_\_\_\_

Email \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Title \_\_\_\_\_

**Acknowledge Addenda's** \_\_\_\_\_  
(List numbers above)

**MEMORIAL HIGH SCHOOL – NEW FAÇADE & SECURE ENTRY**

Bid includes divisions 0 & 1 and bidding requirements.

<b>Bid Package #</b>	<b>Description of Bid Package (name on index)</b>
----------------------	---

_____	_____
-------	-------

Base Bid Amount \$ \_\_\_\_\_

Written \_\_\_\_\_

Calendar Days \_\_\_\_\_

## Bid Bond

THIS DOCUMENT HAS IMPROTANT LEGAL CONSEQUENCES: CONSULTATION WITH AN ATTORNEY IS ENCOURAGED WITH RESPECT TO ITS COMPLETION OR MODIFICATION. AUTHENTICATION OF THIS ELECTRONICALLY DRAFTED AIA DOCUMENT MAY BE MADE BY USING AIA DOCUMENT<sup>401</sup>.

KNOW ALL MEN BY THESE PRESENTS, that we *(Here insert full name and address or legal title of Contractor)* as principal, hereinafter called the Principal, and *(Here insert full name and address or legal title of Surety)* a corporation duly organized under the laws of the State of as Surety, hereinafter called the Surety, are held and firmly bound unto *(Here insert full name and address or legal title of Owner)* as Obligee, hereinafter called the Obligee, in the sum of Dollars (\$), for the payment of which sum well and truly to be made, the said Principal and the said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for *(Here insert full name, address, and description of project)*

NOW, THEREFORE, if the Obligee shall accept the bid of the Principal and the Principal shall enter into a Contract with the Obligee in accordance with the terms of such bid, and give such bond or bonds as may be specified in the bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such Contract and give such bond or bonds, if the Principal shall pay to the Obligee may in good faith contract with another party to perform the Work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this day of 20\_\_

_____	_____	_____
<i>(Witness)</i>	<i>(Principal)</i>	<i>(Seal)</i>
_____	_____	_____
	<i>(Title)</i>	
_____	_____	_____
	<i>(Surety)</i>	<i>(Seal)</i>
_____	_____	_____
<i>(Witness)</i>		<i>(Title)</i>

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SECTION 00150 - NON-COLLUSION AFFIDAVIT

STATE OF OKLAHOMA )

COUNTY OF TULSA ) ss.  
)

\_\_\_\_\_, of lawful age, being first duly sworn, on oath says that (she)he is the agent authorized by the bidder to submit the attached bid. Affiant further states that the bidder has not been a party to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding; or with any state official or employee as to quantity, quality, or price in any discussions between bidders and any state official concerning exchange of money or other thing of value for special consideration in the letting of a contract.

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 2021.

\_\_\_\_\_  
Company Representative

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

My Commission Expires:

SECTION 000160 – BUSINESS RELATIONSHIP AFFIDAVIT

STATE OF OKLAHOMA )  
COUNTY OF TULSA ) ss.  
)

\_\_\_\_\_, of lawful age, being first duly sworn, on oath says that (she)he is the agent authorized by the bidder to submit the attached bid. Affiant further states that the nature of any partnership, joint venture, or other business relationship presently in effect or which existed within one (1) year prior to the date of this statement with the Architect, Engineer, or other party to the project is as follows:

Affiant further states that any such business relationship presently in effect or which existed within one (1) year prior to the date of this statement between any officer or director of the bidding company, any officer or director of the architectural or engineering firm or other party to the project is as follows:

Affiant further states that the names of all persons having any such business relationships and the positions they hold with their respective companies or firms are as follows:

(If none of the business relationships herein above mentioned exist, affiant should so state.)

\_\_\_\_\_  
Company Representative

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 2021.

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

My Commission Expires:  
  
\_\_\_\_\_

## SECTION 00170 – NON-DISCRIMINATION AFFIDAVIT

The Contractor affirms and states that he/she complies with the following:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, sex, religion, national origin or age. The Contractor will take affirmative action to insure that applicants are employed and that employees are treated during employment without regard to their race, color, sex, religion, national origin or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the requirements of these nondiscrimination provisions.
2. The Contractor will state, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, that all qualified applicants will receive consideration for employment without regard to race, color, sex, religion, national origin or age."

---

Company Representative

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 2021.

---

Notary Public

My Commission Expires:

---



## SECTION 00180 - FELONY FREE AFFIDAVIT

STATE OF OKLAHOMA     )  
  ) ss.  
COUNTY OF TULSA        )

The undersigned, under the penalties of perjury, certifies to the Tulsa Public Schools (“School District”) as follows:

1.     The undersigned:

\_\_\_\_\_ has a contract with the School District; OR  
\_\_\_\_\_ is the duly authorized representative of a business (“entity”) having a contract with the School District,

to perform work on School District premises on a full-time or part-time basis.

2.     The undersigned hereby certifies that neither the undersigned nor any employee of the undersigned or of the entity, or of any subcontractor of the undersigned or the entity, will perform work on School District premises on a full-time or part-time basis that would otherwise be performed by School District employees if such employee has been convicted in this State, the United States or any other state of any felony offense unless ten (10) years have elapsed since the date of the criminal conviction or the employee has received a pardon for the offense.

3.     Neither the undersigned nor any employee of the undersigned, or the entity, or of any subcontractor of the undersigned or the entity, who performs any work on School District property is currently registered under the Oklahoma Sex Offenders Registration Act or the Mary Rippy Violent Crime Offenders Registration Act.

4.     The undersigned, or the entity, has conducted a felony record search of all employees who will be assigned to work on a full-time or part-time basis on School District property.

5. This Affidavit is made and delivered pursuant to the requirements of **OKLA. STAT. tit. 70, § 6-101.48 (Supp. 2000)** and **OKLA. STAT. tit. 57, § 589 (Supp. 2004)** (the “Acts”). The undersigned further certifies to the School District that the undersigned and/or the entity are in full compliance with the requirements of the Acts.

EXECUTED AND DELIVERED this \_\_\_\_ day of \_\_\_\_\_,  
\_\_\_\_\_.

\_\_\_\_\_  
**AFFIANT’S SIGNATURE**

\_\_\_\_\_  
**(Print Name and Title)**

**Representing:**

\_\_\_\_\_  
**(Name of Entity)**

Subscribed and sworn to before me this \_\_\_\_ day of \_\_\_\_\_,  
\_\_\_\_\_.

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

( S E A L )

Notary Commission Number: \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

SECTION 000190 – ASBESTOS COMPLIANCE FORM

**CERTIFICATION OF COMPLIANCE  
WITH ASBESTOS RESTRICTIONS**

STATE OF \_\_\_\_\_ )  
COUNTY OF \_\_\_\_\_ ) SS.

The undersigned Contractor, of lawful age, being first duly sworn, on oath says that:

- A. Building materials or products incorporated or installed in the construction of \_\_\_\_\_ School addition and/or remodel will be free of asbestos containing materials or products of any kind.
- B. Certification of Compliance with Asbestos Restrictions will be included in any sub-contract connected with the performance of work for this project.
- C. Submit copy in O&M Manuals.

ARCHITECT

By \_\_\_\_\_

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

SUBSCRIBED AND SWORN to before me this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_.

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

My Commission Expires:

## SECTION 000191

### CONTRACTORS QUALIFICATIONS STATEMENT

This form must be submitted seven (7) days prior to the bid date. All questions must be answered, the data must be clear and comprehensive, and must be signed and notarized. If not previously on file.

1. Name of Bidder: \_\_\_\_\_
2. Permanent Main Office Address: \_\_\_\_\_
3. When organized: \_\_\_\_\_
4. If incorporated, when and where \_\_\_\_\_
5. How many years have you been engaged in the contracting business under your present firm or trading name \_\_\_\_\_
6. List 5 projects of similar size work, references with telephone numbers, cost of project and year completed: \_\_\_\_\_

**(1) Project:** \_\_\_\_\_, Year: \_\_\_\_\_,

Cost: \_\_\_\_\_

Reference: \_\_\_\_\_, Phone: \_\_\_\_\_

**(2) Project:** \_\_\_\_\_, Year: \_\_\_\_\_,

Cost: \_\_\_\_\_

Reference: \_\_\_\_\_, Phone: \_\_\_\_\_

**(3) Project:** \_\_\_\_\_, Year: \_\_\_\_\_,

Cost: \_\_\_\_\_

Reference: \_\_\_\_\_, Phone: \_\_\_\_\_

**(4) Project:** \_\_\_\_\_, Year: \_\_\_\_\_,

Cost: \_\_\_\_\_

Reference: \_\_\_\_\_, Phone: \_\_\_\_\_

**(5) Project:** \_\_\_\_\_, Year: \_\_\_\_\_,

Cost: \_\_\_\_\_

Reference: \_\_\_\_\_, Phone: \_\_\_\_\_

7. Have you ever failed to complete any work awarded to you Please explain.

8. Please state the size of your business:

# of employee's (total): \_\_\_\_\_

9. Are any of your job captains bilingual

10. Financial Information:

a. State the name of the bank with whom you do your principal business:

Name of Bank	Address	City, State	Phone Number
--------------	---------	-------------	--------------

b. State 5 trade references with whom you do business:

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

\_\_\_\_\_  
President of Company

\_\_\_\_\_, \_\_\_\_\_  
(Notary Public) (Date)

Affix Notary Seal

**SECTION 000260**

**NO KICK-BACK STATEMENT**

A duplicate of the following statement is required to be signed, notarized, and submitted with each and every copy of the AIA Document G702, "Application and Certificate for Payment", that is presented to the Owner for payment.

STATE OF OKLAHOMA     )  
  ) ss.  
COUNTY OF TULSA        )

The undersigned Contractor, of lawful age, being first duly sworn, an oath says that this invoice is true and correct. Affiant further states that the services as shown by the invoice have been completed in accordance with the contract. Affiant further states that he has made no payment directly or indirectly to any elected official, officer or employee of the State of Oklahoma, any county or local subdivision of the state, of money or any other things of value to obtain payment.

Contractor

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

By \_\_\_\_\_

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

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

My Commission Expires:

\_\_\_\_\_  
[SEAL]

**END OF SECTION**

**SECTION 012000  
PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

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

**1.02 RELATED REQUIREMENTS**

- A. Section 012100 - Allowances: Payment procedures relating to allowances.
- B. Section 012200 - Unit Prices: Payment and modification procedures relating to unit prices.
- C. Section 017800 - Closeout Submittals: Project record documents.

**1.03 SCHEDULE OF VALUES**

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

**1.04 APPLICATIONS FOR PROGRESS PAYMENTS**

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of work.
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place and Stored Materials under this Application.
  - 6. Authorized Change Orders.
  - 7. Total Completed and Stored to Date of Application.
  - 8. Percentage of Completion.
  - 9. Balance to Finish.
  - 10. Retainage.
- E. Execute certification by signature of authorized officer.
- F. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.

- G. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- H. Submit one electronic and three hard-copies of each Application for Payment.
- I. Include the following with the application:
  - 1. Transmittal letter as specified for submittals in Section 013000.
  - 2. Construction progress schedule, revised and current as specified in Section 013000.
  - 3. Current construction photographs specified in Section 013000.
  - 4. Partial release of liens from major subcontractors and vendors.
  - 5. Affidavits attesting to off-site stored products.
- J. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

#### **1.05 MODIFICATION PROCEDURES**

- A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or subcontractors of changes to Contract Documents.
- B. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.
- C. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
  - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
  - 2. Promptly execute the change.
- D. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid. Contractor shall prepare and submit a fixed price quotation within 7 days.
- E. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation. Document any requested substitutions in accordance with Section 01 6000.
- F. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
  - 1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
  - 2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
  - 3. For pre-determined unit prices and quantities, the amount will be based on the fixed unit prices.
  - 4. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.
- G. Substantiation of Costs: Provide full information required for evaluation.
  - 1. On request, provide the following data:
    - a. Quantities of products, labor, and equipment.
    - b. Taxes, insurance, and bonds.
    - c. Overhead and profit.
    - d. Justification for any change in Contract Time.
    - e. Credit for deletions from Contract, similarly documented.
  - 2. Support each claim for additional costs with additional information:



- a. Origin and date of claim.
  - b. Dates and times work was performed, and by whom.
  - c. Time records and wage rates paid.
  - d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.
- 3. For Time and Material work, submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract.
- H. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- I. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- J. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- K. Promptly enter changes in Project Record Documents.

#### **1.06 APPLICATION FOR FINAL PAYMENT**

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
  - 1. All closeout procedures specified in Section 017000.

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

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

**END OF SECTION 012000**

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**SECTION 012500  
SUBSTITUTION PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedural requirements for proposed substitutions.

**1.02 RELATED REQUIREMENTS**

- A. Section 012100 - Allowances, for cash allowances affecting this section.
- B. Section 012200 - Unit Prices, for additional unit price requirements.
- C. Section 012300 - Alternates, for product alternatives affecting this section.
- D. Section 013000 - Administrative Requirements: Submittal procedures, coordination.
- E. Section 016000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.
- F. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Restrictions on emissions of indoor substitute products.

**1.03 DEFINITIONS**

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
  - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
    - a. Unavailability.
    - b. Regulatory changes.
  - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
    - a. Substitution requests offering advantages solely to the Contractor will not be considered.

**1.04 REFERENCE STANDARDS**

- A. CSI/CSC Form 1.5C - Substitution Request (During the Bidding/Negotiating Stage) Current Edition.
- B. CSI/CSC Form 13.1A - Substitution Request (After the Bidding/Negotiating Phase) Current Edition.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL REQUIREMENTS**

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
  - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
  - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
  - 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- B. A Substitution Request for specified installer constitutes a representation that the submitter:

1. Has acted in good faith to obtain services of specified installer, but was unable to come to commercial, or other terms.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
  1. Note explicitly any non-compliant characteristics.
- D. Where "basis of design" or named products are specified, alternate equivalent manufacturers and materials may be proposed provided they are of equal quality and appearance to that specified, in the opinion of the Architect. Contractor shall provide an item-by-item and side-by-side comparison of proposed substitutions. Include all deviations and / or differences between proposed product and specified product. Include side-by-side images to indicate differences in appearance. Substitution forms without this information or incomplete proposals will be returned without review. Contractor to coordinate alternate substrate and backing requirements that may be required and compatibility with other adjacent materials and systems.
- E. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
  1. No specific form is required. Contractor's Substitution Request documentation must include the following:
    - a. Project Information:
      - 1) Official project name and number, and any additional required identifiers established in Contract Documents.
      - 2) Owner's, Architect's, and Contractor's names.
      - 3) Additional information as required to facilitate review.
    - b. Substitution Request Information:
      - 1) Discrete and consecutive Substitution Request number, and descriptive subject/title.
      - 2) Indication of whether the substitution is for cause or convenience.
      - 3) Issue date.
      - 4) Reference to particular Contract Document(s) specification section number, title, and article/paragraph(s).
      - 5) Description of Substitution.
      - 6) Reason why the specified item cannot be provided.
      - 7) Differences between proposed substitution and specified item.
      - 8) Description of how proposed substitution affects other parts of work.
    - c. Attached Comparative Data: Provide point-by-point, side-by-side comparison addressing essential attributes specified, as appropriate and relevant for the item:
      - 1) Physical characteristics.
      - 2) In-service performance.
      - 3) Expected durability.
      - 4) Visual effect.
      - 5) Sustainable design features.
      - 6) Warranties.
      - 7) Other salient features and requirements.
      - 8) Include, as appropriate or requested, the following types of documentation:
        - (a) Product Data:
        - (b) Samples.
        - (c) Certificates, test, reports or similar qualification data.
        - (d) Drawings, when required to show impact on adjacent construction elements.
        - (e) Photos or images.
        - (f) Provide clear, legible, high resolution electronic documents.
          - (1) Blurry, distorted, or miss-aligned text or images, or low-quality scans of printed materials will not be reviewed.
    - d. Impact of Substitution:
      - 1) Savings to Owner for accepting substitution.

- 2) Change to Contract Time due to accepting substitution.
- F. Limit each request to a single proposed substitution item.
  1. Submit an electronic document, combining the request form with supporting data into single document.
- G. Substitutions will not be considered when acceptance will require revisions to Contract Documents.
- H. Substitution requests that do not follow all specified procedures or contain all specified requirements and information will be returned without review.
  1. All substitution requests must be reviewed by architect.
  2. Vendor correspondence or solicitation to engineers or architect's consultants does not constitute a substitution request.

### **3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT**

- A. Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period, and the documents required.

### **3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION**

- A. Architect will consider requests for substitutions only within 30 days after date of Agreement.
- B. Submit request for Substitution for Cause immediately upon discovery of need for substitution, but not later than 15 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- C. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 15 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
  1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
  2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
  3. Bear the costs engendered by proposed substitution of:
    - a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
    - b. Other construction by Owner.
    - c. Other unanticipated project considerations.
- D. Substitutions will not be considered under one or more of the following circumstances:
  1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
  2. Without a separate written request.
  3. When acceptance will require revisions to Contract Documents.

### **3.04 RESOLUTION**

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.
  1. Architect's decision following review of proposed substitution will be noted on the submitted form.

### **3.05 ACCEPTANCE**

- A. Accepted substitutions change the work of the Project.

### **3.06 CLOSEOUT ACTIVITIES**

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. Include completed Substitution Request Forms as part of the Project record.

### **END OF SECTION 012500**

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**SECTION 013000  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Progress photographs.
- G. Time-lapse video documentation.
- H. Coordination drawings.
- I. Submittals for review, information, and project closeout.
- J. Number of copies of submittals.
- K. Requests for Interpretation (RFI) procedures.
- L. Submittal procedures.

**1.02 RELATED REQUIREMENTS**

- A. Section 016000 - Product Requirements: General product requirements.
- B. Section 017000 - Execution and Closeout Requirements: Additional coordination requirements.
- C. Section 017800 - Closeout Submittals: Project record documents; operation and maintenance data; warranties and bonds.

**1.03 REFERENCE STANDARDS**

- A. AIA G716 - Request for Information 2004.
- B. AIA G810 - Transmittal Letter 2001.
- C. CSI/CSC Form 12.1A - Submittal Transmittal Current Edition.
- D. CSI/CSC Form 13.2A - Request for Information Current Edition.

**1.04 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
  - 1. Requests for Interpretation (RFI).
  - 2. Requests for substitution.
  - 3. Shop drawings, product data, and samples.
  - 4. Test and inspection reports.
  - 5. Design data.
  - 6. Manufacturer's instructions and field reports.
  - 7. Applications for payment and change order requests.
  - 8. Progress schedules.
  - 9. Coordination drawings.
  - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
  - 11. Closeout submittals.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE**

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
  - 1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
  - 2. Contractor and Architect are required to use this service.
  - 3. It is Contractor's responsibility to submit documents in allowable format.
  - 4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge.
  - 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, [www.adobe.com](http://www.adobe.com), or Bluebeam PDF Revu, [www.bluebeam.com](http://www.bluebeam.com)), unless such software capability is provided by the service provider.
  - 6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
  - 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Cost: The cost of the service is to be paid by Contractor; include the cost of the service in the Contract Sum.
- C. Submittal Service: The selected service is:
  - 1. Mutually agreed upon by Architect, Contractor and Owner.
- D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.
  - 1. Representatives of Owner are scheduled and included in this training.
- E. Project Closeout: Contractor may determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

### **3.02 PRECONSTRUCTION MEETING**

- A. Schedule meeting after Notice of Award.
- B. Attendance Required:
  - 1. Owner.
  - 2. Architect.
  - 3. Contractor.
- C. Agenda:
  - 1. Execution of Owner-Contractor Agreement.
  - 2. Submission of executed bonds and insurance certificates.
  - 3. Distribution of Contract Documents.
  - 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
  - 5. Submission of initial Submittal schedule.
  - 6. Designation of personnel representing the parties to Contract.
  - 7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  - 8. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with copy to Architect, Owner, participants, and those affected by decisions made.

### **3.03 PROGRESS MEETINGS**



- A. Schedule and administer meetings throughout progress of the work at maximum monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
  - 1. Contractor.
  - 2. Owner.
  - 3. Architect.
  - 4. Special consultants.
  - 5. Contractor's superintendent.
  - 6. Major subcontractors.
  - 7. Owner's Vendors, as appropriate for coordination.
- D. Agenda:
  - 1. Review minutes of previous meetings.
  - 2. Review of work progress.
  - 3. Field observations, problems, and decisions.
  - 4. Identification of problems that impede, or will impede, planned progress.
  - 5. Review of submittals schedule and status of submittals.
  - 6. Review of RFIs log and status of responses.
  - 7. Review of off-site fabrication and delivery schedules.
  - 8. Maintenance of progress schedule.
  - 9. Corrective measures to regain projected schedules.
  - 10. Planned progress during succeeding work period.
  - 11. Coordination of projected progress.
  - 12. Maintenance of quality and work standards.
  - 13. Effect of proposed changes on progress schedule and coordination.
  - 14. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

### **3.04 CONSTRUCTION PROGRESS SCHEDULE**

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
  - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

### **3.05 PROGRESS PHOTOGRAPHS**

- A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- B. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.
- C. Photography Type: Digital; electronic files.
- D. Provide photographs of site and construction throughout progress of work produced by photographer, acceptable to Architect.
  - 1. Contractor may take photos. Professional photography is not required.
- E. In addition to periodic, recurring views, take photographs of each of the following events:

1. Completion of site clearing.
  2. Excavations in progress.
  3. Foundations in progress and upon completion.
  4. Structural framing in progress and upon completion.
  5. Enclosure of building, upon completion.
  6. Final completion, minimum of ten (10) photos.
- F. Take photographs as evidence of existing project conditions as follows:
1. Interior views: Existing items to be salvaged.
  2. Exterior views: Existing structures or items to remain.
- G. Views:
1. Provide non-aerial photographs from four cardinal views at each specified time, until date of Substantial Completion.
  2. Consult with Architect for instructions on views required.
  3. Provide factual presentation.
  4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- H. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
1. Delivery Medium: Via email.
  2. File Naming: Include project identification, date and time of view, and view identification.
  3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

### **3.06 PROGRESS VIDEO DOCUMENTATION**

- A. Provide time-lapse video documentation throughout entire duration of project.
1. Provide a minimum of three vantage points.
  2. Use firm, methods and systems as approved by Owner.

### **3.07 COORDINATION DRAWINGS**

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

### **3.08 REQUESTS FOR INTERPRETATION (RFI)**

- A. Definition: A request seeking one of the following:
1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
  2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
1. Prepare a separate RFI for each specific item.
    - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
    - b. Do not forward requests which solely require internal coordination between subcontractors.
  2. Prepare in a format and with content acceptable to Owner.
    - a. Use AIA G716 - Request for Information .
    - b. Use CSI/CSC Form 13.2A - Request for Interpretation.
  3. Prepare using an electronic version of the form appended to this section.

4. Prepare using software provided by the Electronic Document Submittal Service.
  5. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
  2. Unacceptable Uses for RFIs: Do not use RFIs to request the following::
    - a. Approval of submittals (use procedures specified elsewhere in this section).
    - b. Approval of substitutions (see Section - 016000 - Product Requirements)
    - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
    - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
  3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response.
  4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response.
    - a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
- E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
1. Official Project name and number, and any additional required identifiers established in Contract Documents.
  2. Owner's, Architect's, and Contractor's names.
  3. Discrete and consecutive RFI number, and descriptive subject/title.
  4. Issue date, and requested reply date.
  5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
  6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
  7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.
  2. Note dates of when each request is made, and when a response is received.
  3. Highlight items requiring priority or expedited response.
  4. Highlight items for which a timely response has not been received to date.
  5. Remove improper or frivolous RFIs.
- H. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

- I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
  1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
  2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
  3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
  4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

### **3.09 SUBMITTAL SCHEDULE**

- A. Submit to Architect for review a schedule for submittals in tabular format.
  1. Coordinate with Contractor's construction schedule and schedule of values.
  2. Format schedule to allow tracking of status of submittals throughout duration of construction.
  3. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
  4. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
    - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

### **3.10 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  1. Product data.
  2. Shop drawings.
  3. Samples for selection.
  4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

### **3.11 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:
  1. Design data.
  2. Certificates.
  3. Test reports.
  4. Inspection reports.
  5. Manufacturer's instructions.
  6. Manufacturer's field reports.
  7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

### **3.12 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.

- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
  - 1. Project record documents.
  - 2. Operation and maintenance data.
  - 3. Warranties.
  - 4. Bonds.
  - 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

### **3.13 NUMBER OF COPIES OF SUBMITTALS**

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

### **3.14 SUBMITTAL PROCEDURES**

- A. General Requirements:
  - 1. Use a single transmittal for related items.
  - 2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
  - 3. Transmit using approved form.
    - a. Use form generated by Electronic Document Submittal Service software.
  - 4. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  - 5. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
  - 6. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
    - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
    - b. Clearly indicate marks made by Contractor and marks made by others prior to submitting to Architect. Use prefix before each mark, color coded legend or another method that is clearly understandable.
  - 7. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    - a. Send submittals in electronic format via email to Architect.
  - 8. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
    - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
    - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
  - 9. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
  - 10. Provide space for Contractor and Architect review stamps.
    - a. Include Architect's review stamp on all submittals. Blanks to be filled out as part of Architect's review. Architect will provide stamp in electronic format.
    - b. Provide space for Engineer review stamps.

11. When revised for resubmission, identify all changes made since previous submission.
  12. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
  13. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
  14. Submittals not requested will not be recognized or processed.
  15. Architect will return submittals and shop drawings to the Contractor. The Contractor shall be responsible for transmitting the reviewed submittals and shop drawings.
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
  2. Collect required information into a single submittal.
  3. Submit concurrently with related shop drawing submittal.
  4. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
  2. Do not reproduce Contract Documents to create shop drawings.
  3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
  4. Provide size and scale of shop drawings appropriate for type of material, system or assembly. All text, drawings, dimensions or other graphics shall be clearly legible.
    - a. Shop drawings that are not clearly legible will be returned without review.
- D. Samples Procedures:
1. Transmit related items together as single package.
  2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
  3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

### **3.15 SUBMITTAL REVIEW**

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. Architect's and consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "Reviewed", or language with same legal meaning.
    - b. "Furnish as corrected or reviewed - comments noted", or language with same legal meaning.
      - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
    - c. "Reviewed, comments noted - Submit for record", or language with same legal meaning.
      - 1) Resubmit corrected item, with review notations acknowledged and incorporated. Resubmit separately, or as part of project record documents.
      - 2) Non-responsive resubmittals may be rejected.
  2. Not Authorizing fabrication, delivery, and installation:
    - a. "Revise and Resubmit".
      - 1) Resubmit revised item, with review notations acknowledged and incorporated.

- 2) Non-responsive resubmittals may be rejected.
  - b. "Rejected".
    - 1) Submit item complying with requirements of Contract Documents.
- E. Architect's and consultants' actions on items submitted for information:
  - 1. Items for which no action was taken:
    - a. "Received" - to notify the Contractor that the submittal has been received for record only.
  - 2. Items for which action was taken:
    - a. "Reviewed" - no further action is required from Contractor.

**END OF SECTION 013000**

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**SECTION 013216**  
**CONSTRUCTION PROGRESS SCHEDULE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

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

**1.02 REFERENCE STANDARDS**

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

**1.03 SUBMITTALS**

- A. Within 10 days after date established in Notice to Proceed, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.
- F. Submit in PDF format.

**1.04 QUALITY ASSURANCE**

- A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with one years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRELIMINARY SCHEDULE**

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

**3.02 CONTENT**

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.
- B. Identify each item by specification section number.
- C. Include conferences and meetings in schedule.
- D. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.
- E. Provide separate schedule of submittal dates for shop drawings, product data, and samples, owner-furnished products, products identified under Allowances, and dates reviewed submittals will be required from Architect. Indicate decision dates for selection of finishes.
- F. Indicate delivery dates for owner-furnished products.
- G. Coordinate content with schedule of values specified in Section 012000 - Price and Payment Procedures.
- H. Provide legend for symbols and abbreviations used.

**3.03 BAR CHARTS**

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

### **3.04 UPDATING SCHEDULE**

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

### **3.05 DISTRIBUTION OF SCHEDULE**

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

**END OF SECTION 013216**

**SECTION 013553  
SECURITY PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Security measures including entry control, personnel identification, and miscellaneous restrictions.

**1.02 RELATED REQUIREMENTS**

- A. Section 011000 - Summary: use of premises and occupancy.
- B. Section 015000 - Temporary Facilities and Controls: Temporary lighting, site fence, and barriers and enclosures.

**1.03 SECURITY PROGRAM**

- A. Protect Work , existing premises and Owner's operations from theft, vandalism, and unauthorized entry.
- B. Initiate program in coordination with Owner's existing security system at project mobilization.
- C. Maintain program throughout construction period until Owner acceptance precludes the need for Contractor security.

**1.04 ENTRY CONTROL**

- A. Restrict entrance of persons and vehicles into Project site and existing facilities.
- B. Allow entrance only to authorized persons with proper identification.
- C. Coordinate access of Owner's personnel to site in coordination with Owner's security forces.

**1.05 PERSONNEL IDENTIFICATION**

- A. Provide identification badge to each person authorized to enter premises.
- B. Badge To Include: Personal photograph, name, assigned number , expiration date and employer.
- C. Require return of badges at expiration of their employment on the Work.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION 013553**

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**SECTION 014000  
QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Contractor's construction-related professional design services.
- F. Contractor's design-related professional design services.
- G. Control of installation.
- H. Mock-ups.
- I. Tolerances.
- J. Manufacturers' field services.
- K. Defect Assessment.

**1.02 RELATED REQUIREMENTS**

- A. Document 003100 - Available Project Information: Soil investigation data.
- B. Section 012100 - Allowances: Allowance for payment of testing services.
- C. Section 013000 - Administrative Requirements: Submittal procedures.
- D. Section 016000 - Product Requirements: Requirements for material and product quality.

**1.03 REFERENCE STANDARDS**

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants 2008 (Reapproved 2019).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation 2017.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry 2022.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction 2019.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2021.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing 2021.
- G. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components 2016.
- H. IAS AC89 - Accreditation Criteria for Testing Laboratories 2021.

**1.04 DEFINITIONS**

- A. Contractor's Quality Control Plan: Contractor's management plan for executing the Contract for Construction.
- B. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
  - 1. Design Services Types Required:
    - a. Construction-Related: Services Contractor needs to provide in order to carry out the Contractor's sole responsibilities for construction means, methods, techniques, sequences, and procedures.

- b. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.
- C. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

#### **1.05 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES**

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
  - 1. Temporary sheeting, shoring, or supports.
  - 2. Temporary scaffolding.
  - 3. Temporary bracing.
  - 4. Temporary falsework for support of spanning or arched structures.
  - 5. Temporary foundation underpinning.
  - 6. Temporary stairs or steps required for construction access only.
  - 7. Temporary hoist(s) and rigging.
  - 8. Investigation of soil conditions to support construction equipment.

#### **1.06 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES**

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.
  - 1. Submit a Request for Information to Architect if the criteria indicated are not sufficient to perform required design services.
- C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
  - 1. Structural Design of Steel Connections: As described in Section 051200 - Structural Steel Framing.
  - 2. Structural Design of Steel Connections: As described in Section 052100 - Steel Joist Framing.
  - 3. Structural Design of Steel Decking: As described in Section 053100 - Steel Decking.
  - 4. Structural Design of Metal Framing: As described in Section 054000 - Cold-Formed Metal Framing.
  - 5. Structural Design of Metal Fabrications: As described in Section 055000 - Metal Fabrications.
  - 6. Structural Design of Stairs: As described in Section 055100 - Metal Stairs.
  - 7. Structural Design of Railings: As described in Section 055213 - Pipe and Tube Railings.
  - 8. Structural Design: Include physical characteristics, engineering calculations, and resulting dimensional limitations as described in Section 084313 - Aluminum-Framed Storefronts.
  - 9. Structural Design: Include calculations for resisting wind loads, anchor locations, loads at points of attachment to building structure, physical characteristics, resulting dimensional limitations as described in Section 084413 - Glazed Aluminum Curtain Walls.
  - 10. Sprinkler Layout: Coordinate with ceiling installation, detailed pipe layout, and hydraulic calculations as described in Section 211300 - Fire-Suppression Sprinkler Systems.
  - 11. Additional design as indicated.
    - a. Contractor shall employ a consultant qualified to interpret structural criteria and other applicable criteria that pertains to the project.

#### **1.07 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

- B. Designer's Qualification Statement: Submit for Architect's knowledge as contract administrator, or for Owner's information.
  - 1. Include information for each individual professional responsible for producing, or supervising production of, design-related professional services provided by Contractor.
    - a. Full name.
    - b. Professional licensure information.
    - c. Statement addressing extent and depth of experience specifically relevant to design of items assigned to Contractor.
- C. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
  - 1. Include calculations that have been used to demonstrate compliance to performance and regulatory criteria provided, and to determine design solutions.
  - 2. Include required product data and shop drawings.
  - 3. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
  - 4. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.
- D. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.
    - i. Results of test/inspection.
    - j. Compliance with Contract Documents.
    - k. When requested by Architect, provide interpretation of results.
  - 2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- E. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
  - 1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
  - 2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.
- F. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- G. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
  - 1. Submit report in duplicate within 30 days of observation to Architect for information.
  - 2. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

## **1.08 QUALITY ASSURANCE**

- A. Testing Agency Qualifications:

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1. Prior to start of work, 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. Qualification Statement: Provide documentation showing testing laboratory is accredited under IAS AC89.
- B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Contractor's Quality Control (CQC) Plan:
1. Prior to start of work, submit a comprehensive plan describing how contract deliverables will be produced. Tailor CQC plan to specific requirements of the project. Include the following information:
    - a. Management Structure: Identify personnel responsible for quality. Include a chart showing lines of authority.
    - b. Management Approach: Define, describe, and include in the plan specific methodologies used in executing the work.
      - 1) Management and control of documents and records relating to quality.
      - 2) Communications.
      - 3) Coordination procedures.
      - 4) Resource management.
      - 5) Process control.
      - 6) Inspection and testing procedures and scheduling.
      - 7) Control of noncomplying work.
      - 8) Tracking deficiencies from identification, through acceptable corrective action, and verification.
      - 9) Control of testing and measuring equipment.
      - 10) Project materials certification.
      - 11) Managerial continuity and flexibility.
    - c. Owner will not make a separate payment for providing and maintaining a Quality Control Plan. Include associated costs in Bid price.
    - d. Acceptance of the plan is required prior to start of construction activities not including mobilization work. Owner's acceptance of the plan will be conditional and predicated on continuing satisfactory adherence to the plan. Owner reserves the right to require Contractor to make changes to the plan and operations, including removal of personnel, as necessary, to obtain specified quality of work results.
- D. Quality-Control Personnel Qualifications. Engage a person with requisite training and experience to implement and manage quality assurance (QA) and quality control (QC) for the project.

## 1.09 REFERENCES AND STANDARDS

- A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.
- C. Obtain copies of standards where required by product specification sections.
- D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.
- E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.



- F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from Contract Documents by mention or inference otherwise in any reference document.

#### **1.10 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Contractor Employed Agency:
  - 1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM E699, ASTM C1021, ASTM C1077, ASTM C1093, ASTM D3740, and as required for project.
  - 2. Inspection agency: Comply with requirements of ASTM D3740, ASTM E329, and as required for project.
  - 3. Laboratory Qualifications: Accredited by IAS according to IAS AC89.
  - 4. Laboratory: Authorized to operate in the State in which the Project is located.
  - 5. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

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

#### **PART 3 EXECUTION**

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

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

##### **3.02 MOCK-UPS**

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.
- C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.
  - 1. Provide the minimum integrated exterior mock-up, unless more stringent requirements are indicated on drawings:
    - a. 12 ft x 12 ft size to include all specified exterior wall materials, including complete assembly from exterior face to interior face. Include all sealants, flashing and trim and at least one window unit.

- D. Room Mock-ups: Construct room mock-ups as indicated on drawings. Coordinate installation of materials, products, and assemblies as required in specification sections; finish according to requirements. Provide required lighting and any supplemental lighting where required to enable Architect to evaluate quality of the mock-up.
- E. Notify Architect fifteen (15) working days in advance of dates and times when mock-ups will be constructed.
- F. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.
- G. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- H. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- I. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
  - 1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
  - 2. Make corrections as necessary until Architect's approval is issued.
- J. Accepted mock-ups shall be a comparison standard for the remaining Work.
- K. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.
- L. Legally salvage and recycle the demolished mock-up materials.

### **3.03 TOLERANCES**

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

### **3.04 TESTING AND INSPECTION**

- A. See individual specification sections for testing and inspection required.
- B. Testing Agency Duties:
  - 1. 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. Attend preconstruction meetings and progress meetings.
  - 7. Submit reports of all tests/inspections specified.
- C. Limits on Testing/Inspection Agency Authority:
  - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency may not approve or accept any portion of the Work.
  - 3. Agency may not assume any duties of Contractor.
  - 4. Agency has no authority to stop the Work.
- D. Contractor Responsibilities:
  - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.

2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
  6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

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

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

### **3.06 DEFECT ASSESSMENT**

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

**END OF SECTION 014000**

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**SECTION 015000  
TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

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

**1.02 RELATED REQUIREMENTS**

- A. Section 013553 - Security Procedures
- B. Section 015100 - Temporary Utilities.
- C. Section 015500 - Vehicular Access and Parking.

**1.03 REFERENCE STANDARDS**

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- B. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).

**1.04 TEMPORARY UTILITIES - SEE SECTION 015100**

- A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
- B. Existing facilities may be used.
- C. New permanent facilities may be used.
- D. Use trigger-operated nozzles for water hoses, to avoid waste of water.

**1.05 TELECOMMUNICATIONS SERVICES**

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
  - 1. Contractor's option.

**1.06 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.
- C. At end of construction, return facilities to same or better condition as originally found.

**1.07 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

- C. Provide protection for plants designated to remain. Replace damaged plants.
- D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.
- E. Traffic Controls: As indicated on drawings.

#### **1.08 FENCING**

- A. Construction: Contractor's option.
- B. Provide 6 foot (1.8 m) high fence around construction site; equip with vehicular and pedestrian gates with locks.

#### **1.09 EXTERIOR ENCLOSURES**

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

#### **1.10 INTERIOR ENCLOSURES**

- A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.
- B. Construction: Framing and reinforced polyethylene sheet materials with closed joints and sealed edges at intersections with existing surfaces:
  1. STC rating of 35 in accordance with ASTM E90.
  2. Maximum flame spread rating of 75 in accordance with ASTM E84.
- C. Paint surfaces exposed to view from Owner-occupied areas.

#### **1.11 SECURITY - SEE SECTION 013553**

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

#### **1.12 VEHICULAR ACCESS AND PARKING - SEE SECTION 015500**

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

#### **1.13 WASTE REMOVAL**

- A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.
- B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- C. Provide containers with lids. Remove trash from site periodically.
- D. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

#### **1.14 PROJECT IDENTIFICATION**

- A. Provide project identification sign of design, construction, and location approved by Owner.
- B. No other signs are allowed without Owner permission except those required by law.

#### **1.15 FIELD OFFICES**

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.
- C. Locate offices a minimum distance of 100 feet (30 m) from existing and new structures.

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

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

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

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

**END OF SECTION 015000**

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## **SECTION 015100 TEMPORARY UTILITIES**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

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

#### **1.02 RELATED REQUIREMENTS**

- A. Section 015000 - Temporary Facilities and Controls:
  - 1. Temporary telecommunications services for administrative purposes.
  - 2. Temporary sanitary facilities required by law.

#### **1.03 REFERENCE STANDARDS**

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

#### **1.04 TEMPORARY ELECTRICITY**

- A. Connect to Owner's existing power service.
  - 1. Do not disrupt Owner's need for continuous service.
  - 2. Exercise measures to conserve energy.
  - 3. Provide separate metering and reimburse Owner for cost of energy used.
- B. Provide temporary electric feeder from existing building electrical service at location as directed.
- C. Complement existing power service capacity and characteristics as required.
- D. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.
- E. Provide main service disconnect and over-current protection at convenient location and meter.
- F. Permanent convenience receptacles may be utilized during construction.
- G. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

#### **1.05 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES**

- A. Provide and maintain LED, compact fluorescent, or high-intensity discharge lighting as suitable for the application for construction operations in accordance with requirements of 29 CFR 1926 and authorities having jurisdiction.
- B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.
- C. Maintain lighting and provide routine repairs.
- D. Permanent building lighting may be utilized during construction.

#### **1.06 TEMPORARY HEATING**

- A. Cost of Energy: By Contractor.
- B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.
- C. Maintain minimum ambient temperature of 50 degrees F (10 degrees C) in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Owner's existing heat plant may be used.
  - 1. Exercise measures to conserve energy.
  - 2. Provide separate metering and reimburse Owner for cost of energy used.
- E. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

### **1.07 TEMPORARY COOLING**

- A. Cost of Energy: By Contractor.
- B. Provide cooling devices and cooling as needed to maintain specified conditions for construction operations.
- C. Maintain maximum ambient temperature of 80 degrees F (26 degrees C) in areas where construction is in progress, unless indicated otherwise in specifications.
- D. Owner's existing cooling plant may be used.
  - 1. Exercise measures to conserve energy.
  - 2. Provide separate metering and reimburse Owner for cost of energy used.
- E. Prior to operation of permanent equipment for temporary cooling purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

### **1.08 TEMPORARY VENTILATION**

- A. Utilize existing ventilation equipment. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

### **1.09 TEMPORARY WATER SERVICE**

- A. Cost of Water Used: By Contractor.
- B. Connect to existing water source.
  - 1. Exercise measures to conserve water.
  - 2. Provide separate metering and reimburse Owner for cost of water used.

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

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

**END OF SECTION 015100**

**SECTION 015500  
VEHICULAR ACCESS AND PARKING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Access roads.
- B. Parking.
- C. Existing pavements and parking areas.
- D. Permanent pavements and parking facilities.
- E. Construction parking controls.
- F. Flag persons.
- G. Flares and lights.
- H. Haul routes.
- I. Traffic signs and signals.
- J. Maintenance.
- K. Removal, repair.
- L. Mud from site vehicles.

**1.02 RELATED REQUIREMENTS**

- A. Section 011000 - Summary: For access to site, work sequence, and occupancy.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Temporary Construction: Contractor's option.
- B. Materials for Permanent Construction: As specified in product specification sections, including earthwork, paving base, and topping.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Clear areas, provide surface and storm drainage of road, parking, area premises, and adjacent areas.

**3.02 ACCESS ROADS**

- A. Use of existing on-site streets and driveways for construction traffic is permitted.
- B. Tracked vehicles not allowed on paved areas.
- C. Construct new temporary all-weather access roads from public thoroughfares to serve construction area, of a width and load bearing capacity to provide unimpeded traffic for construction purposes.
- D. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
- E. Extend and relocate as work progress requires, provide detours as necessary for unimpeded traffic flow.
- F. Provide unimpeded access for emergency vehicles. Maintain 20 foot (6 m) width driveways with turning space between and around combustible materials.
- G. Provide and maintain access to fire hydrants free of obstructions.

**3.03 PARKING**

- A. Use of designated areas of existing parking facilities by construction personnel is permitted.
- B. Use of designated areas of new parking facilities by construction personnel is permitted.
- C. Provide temporary parking areas to accommodate use of construction personnel.

- D. When site space is not adequate, provide additional off-site parking.
- E. Locate as approved by Owner.

#### **3.04 PERMANENT PAVEMENTS AND PARKING FACILITIES**

- A. Prior to Substantial Completion the base for permanent roads and parking areas may be used for construction traffic.
- B. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

#### **3.05 CONSTRUCTION PARKING CONTROL**

- A. Control vehicular parking to prevent interference with public traffic and parking, access by emergency vehicles, and Owner's operations.
- B. Monitor parking of construction personnel's vehicles in existing facilities. Maintain vehicular access to and through parking areas.
- C. Prevent parking on or adjacent to access roads or in non-designated areas.

#### **3.06 FLAG PERSONS**

- A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

#### **3.07 FLARES AND LIGHTS**

- A. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

#### **3.08 HAUL ROUTES**

- A. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
- B. Confine construction traffic to designated haul routes.
- C. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

#### **3.09 TRAFFIC SIGNS AND SIGNALS**

- A. At approaches to site and on site, install at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.
- B. Relocate as work progresses, to maintain effective traffic control.

#### **3.10 MAINTENANCE**

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
- B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

#### **3.11 REMOVAL, REPAIR**

- A. Remove temporary roads when permanent paving is usable.
- B. Repair existing facilities damaged by use, to original condition.
- C. Remove equipment and devices when no longer required.
- D. Repair damage caused by installation.

#### **3.12 MUD FROM SITE VEHICLES**

- A. Provide means of removing mud from vehicle wheels before entering streets.

**END OF SECTION 015500**

**SECTION 015713  
TEMPORARY EROSION AND SEDIMENT CONTROL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

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

**1.02 REFERENCE STANDARDS**

- A. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit Current Edition.
- B. FHWA FLP-94-005 - Best Management Practices for Erosion and Sediment Control 1995.
- C. USDA TR-55 - Urban Hydrology for Small Watersheds; USDA Natural Resources Conservation Service 2015.

**1.03 PERFORMANCE REQUIREMENTS**

- A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.
- B. Best Management Practices Standard: FHWA FLP-94-005.
- C. Runoff Calculation Standard for Urban Areas: USDA TR-55.
- D. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.
- E. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
- F. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- G. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
  - 1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
  - 2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.
- H. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
  - 1. Control movement of sediment and soil from temporary stockpiles of soil.
  - 2. Prevent development of ruts due to equipment and vehicular traffic.
  - 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- I. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
  - 1. Prevent windblown soil from leaving the project site.
  - 2. Prevent tracking of mud onto public roads outside site.
  - 3. Prevent mud and sediment from flowing onto sidewalks and pavements.
  - 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.

- J. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
  - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
  - 2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
- K. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
  - 1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- L. Open Water: Prevent standing water that could become stagnant.
- M. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Erosion and Sedimentation Control Plan:
  - 1. Submit not less than 30 days prior to anticipated start of clearing, grading, or other work involving disturbance of ground surface cover.
  - 2. Include:
    - a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
    - b. Measurements of existing turbidity of waterways.
    - c. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
    - d. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
    - e. Schedule of temporary preventive measures, in relation to ground disturbing activities.
    - f. Other information required by law.
    - g. Format required by law is acceptable, provided any additional information specified is also included.
  - 3. Obtain the approval of the Plan by authorities having jurisdiction.
  - 4. Obtain the approval of the Plan by Owner.
- C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.
- D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.
- E. Maintenance Instructions: Provide instructions covering inspection and maintenance for temporary measures that must remain after Substantial Completion.

### **PART 3 EXECUTION**

#### **2.01 EXAMINATION**

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

#### **2.02 PREPARATION**

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

## 2.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
  - 1. Width: As required; 20 feet (7 m), minimum.
  - 2. Length: 50 feet (16 m), minimum.
  - 3. Provide at each construction entrance from public right-of-way.
  - 4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
    - a. Unless otherwise indicated.
- C. Linear Sediment Barriers: Made of silt fences, straw bales, or brush (during clearing operations only).
  - 1. Provide linear sediment barriers:
    - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
    - b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
    - c. Along the toe of cut slopes and fill slopes.
    - d. Perpendicular to flow across the bottom of existing and new drainage channels and swales that traverse disturbed areas or carry runoff from disturbed areas; space at maximum of 200 feet apart (at maximum of 60 m apart).
    - e. Across the entrances to culverts that receive runoff from disturbed areas.
  - 2. Space sediment barriers with the following maximum slope length upslope from barrier:
    - a. Slope of Less Than 2 Percent: 100 feet (30 m)..
    - b. Slope Between 2 and 5 Percent: 75 feet (23 m).
    - c. Slope Between 5 and 10 Percent: 50 feet (15 m).
    - d. Slope Between 10 and 20 Percent: 25 feet (7.5 m).
    - e. Slope Over 20 Percent: 15 feet (4.5 m).
      - 1) Unless otherwise indicated on drawings.
- D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
  - 1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
  - 2. Straw bale row blocking entire inlet face area; anchor into pavement.
    - a. Unless otherwise indicated on drawings.
- E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.
- F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
- G. Soil Stockpiles: Protect using one of the following measures:
  - 1. Cover with polyethylene film, secured by placing soil on outer edges.
  - 2. Cover with mulch at least 4 inches (100 mm) thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches (150 mm) of straw or hay.
    - a. Unless otherwise indicated.
- H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
  - 1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.
- I. Temporary Seeding: Use where temporary vegetated cover is required.

## 2.04 MAINTENANCE

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches (13 mm) or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.

- C. Clean out temporary sediment control structures weekly and relocate soil on site.
- D. Place sediment in appropriate locations on site; do not remove from site.

**2.05 CLEAN UP**

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

**END OF SECTION 015713**



**SECTION 015813  
TEMPORARY PROJECT SIGNAGE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Project identification sign.

**1.02 REFERENCE STANDARDS**

- A. FHWA (SHS) - Standard Highway Signs and Markings 2004, with Supplement (2012).

**PART 2 PRODUCTS**

**2.01 PROJECT IDENTIFICATION SIGN**

- A. One vinyl banner, 48 sq ft, minimum.
- B. Graphic Design, Colors, Style of Lettering: Designated by Architect.

**PART 3 EXECUTION**

**3.01 INSTALLATION**

- A. Install project identification sign within 30 days after date fixed by Notice to Proceed.
- B. Erect at location of high public visibility adjacent to main entrance to site.
- C. Install sign surface plumb and level, with butt joints. Anchor securely.

**3.02 MAINTENANCE**

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

**3.03 REMOVAL**

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

**END OF SECTION 015813**

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**SECTION 016000  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

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

**1.02 RELATED REQUIREMENTS**

- A. Section 011000 - Summary: Lists of products to be removed from existing building.
- B. Section 011000 - Summary: Identification of Owner-supplied products.
- C. Section 012500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
- D. Section 014000 - Quality Requirements: Product quality monitoring.
- E. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.
- F. Section 017419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

**1.03 REFERENCE STANDARDS**

- A. C2C (DIR) - C2C Certified Products Registry; Cradle to Cradle Products Innovation Institute Current Edition.
- B. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers 2017, v1.2.
- C. CAN/CSA Z809 - Sustainable Forest Management 2016 (Reaffirmed 2021).
- D. EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products 2014.
- E. GreenScreen (LIST) - GreenScreen for Safer Chemicals List Translator; Clean Production Action Current Edition.
- F. GreenScreen (METH) - GreenScreen for Safer Chemicals Method v1.2; Clean Production Action Current Edition.
- G. ISO 14044 - Environmental Management - Life Cycle Assessment - Requirements and Guidelines 2006, with Amendment (2020).
- H. ISO 21930 - Sustainability in Buildings and Civil Engineering Works — Core Rules for Environmental Product Declarations of Construction Products and Services 2017.
- I. NSF 332 - Sustainability Assessment for Resilient Floor Coverings 2015.

**1.04 SUBMITTALS**

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

- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

## **1.05 QUALITY ASSURANCE**

- A. GreenScreen Chemical Hazard Analysis: Ingredients of 100 parts-per-million or greater evaluated using GreenScreen (METH).
  - 1. Good: GreenScreen (LIST) evaluation to identify Benchmark 1 hazards; a Health Product Declaration includes this information.
  - 2. Better: GreenScreen Full Assessment.
  - 3. Best: GreenScreen Full Assessment by GreenScreen Licensed Profiler.
  - 4. Acceptable Evidence: GreenScreen report.
- B. Health Product Declarations (HPD): Complete, published declaration with full disclosure of known hazards, prepared using one of the HPDC (HPD-OLT) online tools.
- C. Rapidly Renewable Materials: Made from agricultural products that are typically harvested within a 10-year or shorter cycle.
- D. Reused Products: Materials and equipment previously used in this or other construction, salvaged and refurbished as specified.
  - 1. Wood fabricated from timber abandoned in transit after harvesting is considered reused, not recycled.
  - 2. Acceptable Evidence: Information about the origin or source, from Contractor or supplier.
- E. Sustainably Harvested Wood: Solid wood, wood chips, and wood fiber certified or labeled by an organization accredited by one of the following:
  - 1. The Forest Stewardship Council, The Principles for Natural Forest Management; for Canada visit <http://www.fsccanada.org>, for the USA visit <http://www.fscus.org>.
  - 2. Acceptable Evidence: Copies of invoices bearing the certifying organization's certification numbers.

## **PART 2 PRODUCTS**

### **2.01 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.
- D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
  - 1. See Section 011000 for list of items required to be salvaged for reuse and relocation.
    - a. Refer to additional information on drawings.
  - 2. If reuse of other existing materials or equipment is desired, submit substitution request.

### **2.02 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. See Section 014000 - Quality Requirements, for additional source quality control requirements.
- C. Use of products having any of the following characteristics is not permitted:
  - 1. Made using or containing CFC's or HCFC's.

2. Made of wood from newly cut old growth timber.
  3. Containing lead, cadmium, or asbestos.
- D. Where other criteria are met, Contractor shall give preference to products that:
1. If used on interior, have lower emissions, as defined in Section 016116.
  2. If wet-applied, have lower VOC content, as defined in Section 016116.
  3. Are extracted, harvested, and/or manufactured closer to the location of the project.
  4. Have longer documented life span under normal use.
  5. Result in less construction waste. See Section 017419
  6. Are made of vegetable materials that are rapidly renewable.
  7. Are made of recycled materials.
  8. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.
  9. If bio-based, other than wood, are or are made of Sustainable Agriculture Network certified products.
  10. Are Cradle-to-Cradle Certified.
  11. Have a published Environmental Product Declaration (EPD).
  12. Have a published Health Product Declaration (HPD).
  13. Have a published GreenScreen Chemical Hazard Analysis.
  14. Have a published Manufacturer's Inventory of Chemical Content.

### **2.03 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

### **2.04 MAINTENANCE MATERIALS**

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

## **PART 3 EXECUTION**

### **3.01 SUBSTITUTION LIMITATIONS**

- A. See Section 012500 - Substitution Procedures.

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

- A. See Section 011000 - Summary for identification of Owner-supplied products.
- B. Owner's Responsibilities:
  1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
  2. Arrange and pay for product delivery to site.
  3. On delivery, inspect products jointly with Contractor.
  4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
  5. Arrange for manufacturers' warranties, inspections, and service.
- C. Contractor's Responsibilities:
  1. Review Owner reviewed shop drawings, product data, and samples.
  2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
  3. Handle, store, install and finish products.
  4. Repair or replace items damaged after receipt.

### **3.03 TRANSPORTATION AND HANDLING**

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

#### **3.04 STORAGE AND PROTECTION**

- A. Provide protection of stored materials and products against theft, casualty, or deterioration.
- B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.
  - 1. Structural Loading Limitations: Handle and store products and materials so as not to exceed static and dynamic load-bearing capacities of project floor and roof areas.
- C. Store and protect products in accordance with manufacturers' instructions.
- D. Store with seals and labels intact and legible.
- E. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts.
- F. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- G. For exterior storage of fabricated products, place on sloped supports above ground.
- H. Provide off-site storage and protection when site does not permit on-site storage or protection.
- I. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- J. Comply with manufacturer's warranty conditions, if any.
- K. Do not store products directly on the ground.
- L. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- M. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- N. Prevent contact with material that may cause corrosion, discoloration, or staining.
- O. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- P. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**END OF SECTION 016000**

**SECTION 016116**  
**VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Requirements for Indoor-Emissions-Restricted products.
- B. Requirements for VOC-Content-Restricted products.

**1.02 RELATED REQUIREMENTS**

- A. Section 013000 - Administrative Requirements: Submittal procedures.
- B. Section 016000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

**1.03 DEFINITIONS**

- A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:
  - 1. Interior paints and coatings applied on site.
  - 2. Interior adhesives and sealants applied on site, including flooring adhesives.
  - 3. Flooring.
  - 4. Composite wood.
  - 5. Products making up wall and ceiling assemblies.
  - 6. Thermal and acoustical insulation.
  - 7. Other products when specifically stated in the specifications.
- B. VOC-Content-Restricted Products: All products in the following product categories, whether specified or not:
  - 1. Interior paints and coatings applied on site.
  - 2. Interior adhesives and sealants applied on site, including flooring adhesives.
  - 3. Other products when specifically stated in the specifications.
- C. Interior of Building: Anywhere inside the exterior weather barrier.
- D. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.
- F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:
  - 1. Stone.
  - 2. Concrete.
  - 3. Clay brick.
  - 4. Metals that are plated, anodized, or powder-coated.
  - 5. Glass.
  - 6. Ceramics.
  - 7. Solid wood flooring that is unfinished and untreated.

**1.04 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 D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings 2005 (Reapproved 2018).
- C. CAL (CDPH SM) - Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers 2017, v1.2.
- D. CARB (ATCM) - Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products; California Air Resources Board current edition.

- E. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board 2020.
- F. CHPS (HPPD) - High Performance Products Database Current Edition.
- G. CRI (GLP) - Green Label Plus Testing Program - Certified Products Current Edition.
- H. GreenSeal GS-36 - Standard for Adhesives for Commercial Use 2013.
- I. SCAQMD 1113 - Architectural Coatings 1977, with Amendment (2016).
- J. SCAQMD 1168 - Adhesive and Sealant Applications 1989, with Amendment (2017).
- K. SCS (CPD) - SCS Certified Products Current Edition.
- L. UL (GGG) - GREENGUARD Gold Certified Products Current Edition.

## **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: For each VOC-restricted product used in the project, submit evidence of compliance.

## **1.06 QUALITY ASSURANCE**

- A. Indoor Emissions Standard and Test Method: CAL (CDPH SM), using Standard Private Office exposure scenario and the allowable concentrations specified in the method, and range of total VOC's after 14 days.
  - 1. Wet-Applied Products: State amount applied in mass per surface area.
  - 2. Paints and Coatings: Test tinted products, not just tinting bases.
  - 3. Evidence of Compliance: Acceptable types of evidence are the following;
    - a. Current UL (GGG) certification.
    - b. Current SCS (CPD) Floorscore certification.
    - c. Current SCS (CPD) Indoor Advantage Gold certification.
    - d. Current listing in CHPS (HPPD) as a low-emitting product.
    - e. Current CRI (GLP) certification.
    - f. Test report showing compliance and stating exposure scenario used.
  - 4. Product data submittal showing VOC content is NOT acceptable evidence.
  - 5. Manufacturer's certification without test report by independent agency is NOT acceptable evidence.
- B. VOC Content Test Method: 40 CFR 59, Subpart D (EPA Method 24), or ASTM D3960, unless otherwise indicated.
  - 1. Evidence of Compliance: Acceptable types of evidence are:
    - a. Report of laboratory testing performed in accordance with requirements.
    - b. Published product data showing compliance with requirements.
    - c. Certification by manufacturer that product complies with requirements.
- C. Composite Wood Emissions Standard: CARB (ATCM) for ultra-low emitting formaldehyde (ULEF) resins.
  - 1. Evidence of Compliance: Acceptable types of evidence are:
    - a. Current SCS "No Added Formaldehyde (NAF)" certification; [www.scs-certified.com](http://www.scs-certified.com).
    - b. Report of laboratory testing performed in accordance with requirements.
    - c. Published product data showing compliance with requirements.
    - d. Certification by manufacturer that product complies with requirements.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. All Products: Comply with the most stringent of federal, State, and local requirements, or these specifications.



- B. Indoor-Emissions-Restricted Products: Comply with Indoor Emissions Standard and Test Method, except for:
  - 1. Composite Wood, Wood Fiber, and Wood Chip Products: Comply with Composite Wood Emissions Standard or contain no added formaldehyde resins.
  - 2. Inherently Non-Emitting Materials.
- C. VOC-Content-Restricted Products: VOC content not greater than required by the following:
  - 1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.
  - 2. Aerosol Adhesives: GreenSeal GS-36.
  - 3. Joint Sealants: SCAQMD 1168 Rule.
  - 4. Paints and Coatings: Each color; most stringent of the following:
    - a. 40 CFR 59, Subpart D.
    - b. SCAQMD 1113 Rule.
    - c. CARB (SCM).

### **PART 3 EXECUTION**

#### **3.01 FIELD QUALITY CONTROL**

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.
- B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

**END OF SECTION 016116**

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**SECTION 017000  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition, except removal, disposal and / or remediation of hazardous materials and toxic substances..
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.
- I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

**1.02 RELATED REQUIREMENTS**

- A. Section 011000 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 013000 - Administrative Requirements: Submittals procedures.
- C. Section 014000 - Quality Requirements: Testing and inspection procedures.
- D. Section 015000 - Temporary Facilities and Controls: Temporary exterior enclosures.
- E. Section 015000 - Temporary Facilities and Controls: Temporary interior partitions.
- F. Section 015713 - Temporary Erosion and Sediment Control: Additional erosion and sedimentation control requirements.
- G. Section 017419 - Construction Waste Management and Disposal: Additional procedures for trash/waste removal, recycling, salvage, and reuse.
- H. Section 017610 - Temporary Protective Coverings: Materials for protection of installed work.
- I. Section 017800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.
- J. Section 017900 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections
- K. Section 024100 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.
- L. Section 078400 - Firestopping.

**1.03 REFERENCE STANDARDS**

- A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2022, with Errata (2021).

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.
  - 1. On request, submit documentation verifying accuracy of survey work.
  - 2. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.
  - 3. Submit surveys and survey logs for the project record.

- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
  - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences. Include design drawings and calculations for bracing and shoring.
  - 2. Identify demolition firm and submit qualifications.
  - 3. Include a summary of safety procedures.
- D. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
  - 1. Structural integrity of any element of Project.
  - 2. Integrity of weather exposed or moisture resistant element.
  - 3. Efficiency, maintenance, or safety of any operational element.
  - 4. Visual qualities of sight exposed elements.
  - 5. Work of Owner or separate Contractor.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities.

#### **1.05 QUALIFICATIONS**

- A. For demolition work, employ a firm specializing in the type of work required.
  - 1. Minimum of (5) Five years of documented experience.
- B. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,
- C. For field engineering, employ a professional engineer of the discipline required for specific service on Project, licensed in the State in which the Project is located. Employ only individual(s) trained and experienced in establishing and maintaining horizontal and vertical control points necessary for laying out construction work on project of similar size, scope and/or complexity.
- D. For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

#### **1.06 PROJECT CONDITIONS**

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- D. Perform dewatering activities, as required, for the duration of the project.
- E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- F. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
  - 1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
  - 2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- G. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
  - 1. Minimize amount of bare soil exposed at one time.
  - 2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
  - 3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.

- 4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- H. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
  - 1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.
  - 2. Indoors: Limit conduct of especially noisy interior work to 8 am to 5 pm.
- I. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- J. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.
- K. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

## **1.07 COORDINATION**

- A. See Section 011000 for occupancy-related requirements.
- B. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- C. Notify affected utility companies and comply with their requirements.
- D. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- E. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- G. Coordinate completion and clean-up of work of separate sections.
- H. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

## **PART 2 PRODUCTS**

### **2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.

- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### **3.02 PREPARATION**

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

### **3.03 PREINSTALLATION MEETINGS**

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect (7) seven days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of examination, preparation and installation procedures.
  - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

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

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

### **3.05 GENERAL INSTALLATION REQUIREMENTS**

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

### **3.06 ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Architect before disturbing existing installation.
  - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
  - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 015000 at locations as required for Project. Verify locations with Owner..
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
  - 1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
  - 2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.
- D. Remove existing work as indicated and as required to accomplish new work.
  - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
  - 2. Remove items indicated on drawings.
  - 3. Relocate items indicated on drawings.
  - 4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
  - 5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
  - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  - 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
  - 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    - b. See Section 011000 for other limitations on outages and required notifications.
    - c. Provide temporary connections as required to maintain existing systems in service.
  - 4. Verify that abandoned services serve only abandoned facilities.
  - 5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

- F. Protect existing work to remain.
  - 1. Prevent movement of structure; provide shoring and bracing if necessary.
  - 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  - 3. Repair adjacent construction and finishes damaged during removal work.
- G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
  - 1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
  - 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
  - 3. Where a change of plane of 1/4 inch (6 mm) or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
  - 4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.
- H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- I. Refinish existing surfaces as indicated:
  - 1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
  - 2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- J. Clean existing systems and equipment.
- K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- L. Do not begin new construction in alterations areas before demolition is complete.
- M. Comply with all other applicable requirements of this section.

### **3.07 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
  - 1. Complete the work.
  - 2. Fit products together to integrate with other work.
  - 3. Provide openings for penetration of mechanical, electrical, and other services.
  - 4. Match work that has been cut to adjacent work.
  - 5. Repair areas adjacent to cuts to required condition.
  - 6. Repair new work damaged by subsequent work.
  - 7. Remove samples of installed work for testing when requested.
  - 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.



- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.
- J. Patching:
  - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  - 2. Match color, texture, and appearance.
  - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

### **3.08 PROGRESS CLEANING**

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

### **3.09 PROTECTION OF INSTALLED WORK**

- A. See Section 017610 for temporary protective covering materials.
- B. Protect installed work from damage by construction operations.
- C. Provide special protection where specified in individual specification sections.
- D. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- E. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- F. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- G. Protect work from spilled liquids. If work is exposed to spilled liquids, immediately remove protective coverings, dry out work, and replace protective coverings.
- H. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- I. Prohibit traffic from landscaped areas.
- J. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

### **3.10 SYSTEM STARTUP**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

- F. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- G. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### **3.11 DEMONSTRATION AND INSTRUCTION**

- A. See Section 017900 - Demonstration and Training.

### **3.12 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

### **3.13 FINAL CLEANING**

- A. Execute final cleaning prior to final project assessment.
  - 1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.
- B. Use cleaning materials that are nonhazardous.
- C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- F. Replace filters of operating equipment.
- G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- H. Clean site; sweep paved areas, rake clean landscaped surfaces.
- I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### **3.14 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
  - 1. Provide copies to Architect.
  - 2. Provide copies to Owner.
  - 3. Provide copies to Architect and Owner.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Architect when work is considered ready for Architect's Substantial Completion review.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final review.

- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

### **3.15 MAINTENANCE**

**END OF SECTION 017000**

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**SECTION 017123  
FIELD ENGINEERING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Field engineering services by Contractor.
- B. Land surveying services by Contractor.

**1.02 DESCRIPTION OF SERVICES**

- A. Specific services listed in this section are in addition to, and do not supersede, general Execution and Closeout Requirements.
- B. Sole responsibility for establishing all locations, dimensions and levels of items of work.
- C. Sole responsibility for provision of all materials required to establish and maintain benchmarks and control points, including batter boards, grade stakes, structure elevation stakes, and other items.
- D. Keeping a transit, theodolite, or TST (total station theodolite with electronic distance measurement device); leveling instrument; and related implements such as survey rods and other measurement devices, at the project site at all times.
- E. Provision of facilities and assistance necessary for Architect to check lines and grade points placed by Contractor.
  - 1. Performance of excavation or embankment work until after all cross-sectioning necessary for determining payment quantities for Unit Price work have been completed and accepted by Architect.
- F. Preparation and maintenance of professional-quality, accurate, well organized, legible notes of all measurements and calculations made while surveying and laying out the work.
- G. Prior to backfilling operations, surveying - locating, and recording on a copy of Contract Documents - an accurate representation of buried work and Underground Facilities encountered.

**1.03 REFERENCE STANDARDS**

- A. FGDC-STD-007.1 - Geospatial Positioning Accuracy Standards - Part 1: Reporting Methodology 1998.
- B. FGDC-STD-007.2 - Geospatial Positioning Accuracy Standards - Part 2: Standards for Geodetic Networks 1998.
- C. FGDC-STD-007.4 - Geospatial Positioning Accuracy Standards - Part 4: Architecture, Engineering, Construction, and Facilities Measurement 2002.
- D. SMACNA (SRM) - Seismic Restraint Manual Guidelines for Mechanical Systems 2008.
- E. State Plane Coordinate System for the State in which the Project is located.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Submit in addition to items required in Section 017000 - Execution and Closeout Requirements.
- C. Informational Submittals: Submit the following:
  - 1. Field Engineering: Submit daily reports, with content as indicated in this section.
    - a. When requested by Architect, submit for Record documentation verifying accuracy of field engineering including, but not limited to, Contractor's survey notes and field notes.
  - 2. Final property survey.

## **1.06 QUALITY ASSURANCE**

- A. Field Engineer's Qualifications: As established in Section 017000 - Execution and Closeout Requirements.
- B. Land Surveyor's Qualifications: As established in Section 017000 - Execution and Closeout Requirements.
- C. Use adequate number of skilled and thoroughly-trained workers to perform the work of this section in a timely and comprehensive manner.

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

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. Notify Owner's Representative and Architect of any discrepancies immediately in writing before proceeding to lay out the work. Locate and protect existing benchmarks and base line. Preserve permanent reference points during construction.
- B. Existing Utilities and Equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify existing conditions.

### **3.02 FIELD ENGINEERING**

- A. Maintain field office files, drawings, specifications, and record documents.
- B. Coordinate field engineering services with Contractor's subcontractors, installers, and suppliers as appropriate.
- C. Prepare layout and coordination drawings for construction operations.
- D. Check and coordinate the work for conflicts and interferences, and immediately advise Architect and Owner of all discrepancies of which Contractor is aware.
- E. Cooperate as required with Architect and Owner in observing the work and performing field inspections.
- F. Review and coordinate work on a regular basis with shop drawings and Contractor's other submittals.
- G. In general, match existing adjacent grades and maintain existing flow lines.
- H. Check the location, line and grade of every major element as the work progresses. Notify the Architect when deviations from required lines or grades exceed allowable tolerances. Include in such notifications a thorough explanation of the problem, and a proposed plan and schedule for remedying the deviation. Do not proceed with remedial work without Owner's concurrence of the remediation plan.
- I. Check all formwork, reinforcing, inserts, structural steel, bolts, sleeves, piping, other materials and equipment for compliance with shop drawings and Contract Documents requirements.
- J. Check all bracing and shoring for structural integrity and compliance with designs prepared by the Contractor.

### **3.03 LAND SURVEYING**

- A. General: Follow standards for geospatial positioning accuracy.
  - 1. FGDC-STD-007.1 as amended by Authority Having Jurisdiction.
  - 2. FGDC-STD-007.2 as amended by Authority Having Jurisdiction.
  - 3. FGDC-STD-007.4 as amended by Authority Having Jurisdiction.
- B. Coordinate survey data with the State Plane Coordinate System of the State in which the Project is located.

- C. Contractor is responsible for the restoration of all property corners and control monuments damaged or destroyed by construction-related activities. Any disturbed monuments must be replaced at Contractor's expense by a surveyor licensed in the State in which the Project is located, and approved by the Architect.
  - 1. Temporarily suspend work at such points and for such reasonable times as the Owner may require for resetting monuments. The Contractor will not be entitled to any additional compensation or extension of time.

### **3.04 CONSTRUCTION SURVEYING**

- A. General: Perform surveying as applicable to specific items necessary for proper execution of work.
  - 1. Alignment Staking: Provide alignment stakes at 50 foot (15.24 m) intervals on tangent, and at 25 foot (7.62 m) intervals on curves.
  - 2. Slope Staking: Provide slope staking at 50 foot (15.24 m) intervals on tangent, and at 25 foot (7.62 m) intervals on curves. Re-stake at every ten-foot difference in elevation.
  - 3. Structure: Stake out structures, including elevations, and check prior to and during construction.
  - 4. Site Utilities: Stake out utility lines including elevations, and check prior to and during construction.
  - 5. Road: Stake out roadway elevations at 50 foot (15.24 m) 50-foot intervals on tangent, and at 25 foot (7.62 m) intervals on curves.
  - 6. Cross-sections: Provide original, intermediate, and final staking as required, for site work and other locations as necessary for quantity surveys.
  - 7. Easement Staking: Provide easement staking at 50 foot (15.24 m) intervals on tangent, and at 25 foot (7.62 m) intervals on curves. If required by project conditions, provide wooden laths with flagging at 100 foot (30.48 m) intervals.
  - 8. Record Staking: Provide permanent stake at each blind flange and each utility cap is provided for future connections. Use stakes for record staking of material(s) acceptable to Architect.
  - 9. Structural Frame: Upon completion, certify location and plumbness.
- B. Record Log: Maintain a log of layout control work. Record any deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used.
- C. Accuracy:
  - 1. Establish Contractor's temporary survey references points for Contractor's use to at least second-order accuracy (e.g., 1:10000). Set construction staking used as a guide for the work to at least third-order accuracy (e.g., 1:5000). Provide the absolute margin for error specified below on the basis established by such orders.
    - a. Horizontal accuracy of easement staking: Plus or minus 0.1 feet (30.5 mm).
    - b. Accuracy of other staking shall be plus or minus 0.04 feet (12.2 mm) horizontally and plus or minus 0.02 feet (6.1 mm) vertically.
    - c. Include an error analysis sufficient to demonstrate required accuracy in survey calculations.
  - 2. Owner reserves the right to check the Contractor's survey, measurements, and calculations. The requirement for accuracy will not be waived, whether this right is exercised or not.

### **3.05 SUPPORT AND BRACING**

- A. General requirements: Design all support and bracing systems, if required. Provide for attachment to portions of the building structure capable of bearing the loads imposed. Design systems to not overstress the building structure.
- B. Seismic Bracing: Design where required by authorities having jurisdiction.
  - 1. Design and install all support systems to comply with the seismic requirements of the Construction Code of the State in which the Project is located.

2. Design and install seismic bracing so as not to defeat the operation on any required vibration isolation or sound isolation devices.
3. For seismic bracing guidelines for mechanical, electrical and plumbing systems, refer to SMACNA (SRM).

### **3.06 RECORDS**

- A. Maintain at the Site a complete and accurate log of control and survey work as it progresses.
  1. Organize and record survey data in accordance with recognized professional surveying standards, Laws and Regulations, and prevailing standards of practice in the State in which the Project is located. Record Contractor's surveyor's original field notes, computations, and other surveying data in Contractor-furnished hard-bound field books. Contractor is solely responsible for completeness and accuracy of survey work, and completeness and accuracy of survey records, including field books. Survey records, (including field books) may be rejected by Owner due to failure to organize and maintain survey records in a manner that allows reasonable and independent verification of calculations, and/or allows identification of elevations, dimensions, and grades of the work.
  2. Illegible notes or data, and erasures on any page of field books, are unacceptable. Do not submit copied notes or data. Corrections by ruling or lining out errors will be unacceptable unless initialed by the surveyor. Violation of these requirements may require re-surveying the data questioned by Architect.
- B. Submit three copies of final property survey to Owner. Include on the survey a certification, signed by the surveyor, that principal metes, bounds, lines, and levels of the Project are accurately positioned as shown on the survey. Include the following information:
  1. Structure locations from property lines, and distances to adjacent buildings.
  2. Dimensions and locations of drives, walks, walls, underground utilities, appurtenances, and major site features.
  3. Location of easements.
  4. Final grading topographic survey.

### **3.07 CLOSEOUT ACTIVITIES**

- A. See Section 017800 - Closeout Submittals, for closeout submittals.

**END OF SECTION 017123**



**SECTION 017419  
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

**PART 1 GENERAL**

**1.01 WASTE MANAGEMENT REQUIREMENTS**

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Owner may decide to pay for additional recycling, salvage, and/or reuse based on Landfill Alternatives Proposal specified below.
- E. Optional Recycling, Salvage, and Reuse:
  - 1. Aluminum and plastic beverage containers.
  - 2. Corrugated cardboard.
  - 3. Wood pallets.
  - 4. Clean dimensional wood.
  - 5. Land clearing debris, including brush, branches, logs, and stumps.
  - 6. Concrete: May be crushed and used as riprap, aggregate, sub-base material, or fill.
  - 7. Bricks: May be used on project if whole, or crushed and used as landscape cover, sub-base material, or fill.
  - 8. Concrete masonry units: May be used on project if whole, or crushed and used as sub-base material or fill.
  - 9. Precast concrete panels: May be used for erosion control or landscape features.
  - 10. Asphalt paving: May be recycled into paving for project.
  - 11. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
  - 12. Glass.
  - 13. Gypsum drywall and plaster.
  - 14. Plastic buckets.
  - 15. Carpet, carpet cushion, carpet tile, and carpet remnants, both new and removed: DuPont (<http://flooring.dupont.com>) and Interface ([www.interfaceinc.com](http://www.interfaceinc.com)) conduct reclamation programs.
  - 16. Asphalt roofing shingles.
  - 17. Plastic sheeting.
  - 18. Rigid foam insulation.
  - 19. Vinyl siding.
  - 20. Windows, doors, and door hardware.
  - 21. Plumbing fixtures.
  - 22. Acoustical ceiling tile and panels.
- F. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- G. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- H. The following sources may be useful in developing the Waste Management Plan:
- I. Methods of trash/waste disposal that are not acceptable are:
  - 1. Burning on the project site.
  - 2. Burying on the project site.
  - 3. Dumping or burying on other property, public or private.
  - 4. Other illegal dumping or burying.

- 5. Incineration, either on- or off-site.
- J. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

## **1.02 RELATED REQUIREMENTS**

- A. Section 011000 - Summary: List of items to be salvaged from the existing building for relocation in project or for Owner.
- B. Section 013000 - Administrative Requirements: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
- C. Section 015000 - Temporary Facilities and Controls: Additional requirements related to trash/waste collection and removal facilities and services.
- D. Section 016000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- E. Section 017000 - Execution and Closeout Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

## **1.03 DEFINITIONS**

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

## **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

- B. Landfill Alternatives Proposal: Within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner, submit a projection of trash/waste that will require disposal and alternatives to landfilling, with net costs.
  1. Submit to Architect for Owner's review and approval.
  2. If Owner wishes to implement any cost alternatives, the Contract Price will be adjusted as specified elsewhere.
  3. Include an analysis of trash/waste to be generated and landfill options as specified for Waste Management Plan described below.
  4. Describe as many alternatives to landfilling as possible:
    - a. List each material proposed to be salvaged, reused, or recycled.
    - b. List the proposed local market for each material.
    - c. State the estimated net cost resulting from each alternative, after subtracting revenue from sale of recycled or salvaged materials and landfill tipping fees saved due to diversion of materials from the landfill.
  5. Provide alternatives to landfilling for at least the following materials:
    - a. Land clearing debris, including brush, branches, logs, and stumps.
    - b. Paint.
    - c. Mechanical and electrical equipment.
    - d. Fluorescent lamps (light bulbs).
- C. Once Owner has determined which of the landfill alternatives addressed in the Proposal above are acceptable, prepare and submit Waste Management Plan; submit within 10 calendar days after notification by Architect.
- D. Waste Management Plan: Include the following information:
  1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
  2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
  3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
    - a. List each material proposed to be salvaged, reused, or recycled.
    - b. List the local market for each material.
    - c. State the estimated net cost, versus landfill disposal.
  4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
  5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
  6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
- E. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
  1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
  2. Submit Report on a form acceptable to Owner.
  3. Landfill Disposal: Include the following information:
    - a. Identification of material.
    - b. Amount, in tons or cubic yards (cubic meters), of trash/waste material from the project disposed of in landfills.
    - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.

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

### **PART 3 EXECUTION**

#### **2.01 WASTE MANAGEMENT PROCEDURES**

- A. See Section 011000 for list of items to be salvaged from the existing building for relocation in project or for Owner.
- B. See Section 013000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- C. See Section 015000 for additional requirements related to trash/waste collection and removal facilities and services.
- D. See Section 016000 for waste prevention requirements related to delivery, storage, and handling.
- E. See Section 017000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

#### **2.02 WASTE MANAGEMENT PLAN IMPLEMENTATION**

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
  - 1. Prebid meeting.
  - 2. Preconstruction meeting.
  - 3. Regular job-site meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
  - 1. Provide containers as required.
  - 2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
  - 3. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
  - 4. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

**END OF SECTION 017419**

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**SECTION 017610  
TEMPORARY PROTECTIVE COVERINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary protective coverings for installed floors, walls, other surfaces, and existing finishes to remain.

**1.02 RELATED REQUIREMENTS**

- A. Section 017000 - Execution and Closeout Requirements: Coordination of requirements for materials specified in this section.

**1.03 REFERENCE STANDARDS**

- A. ANSI A135.4 - Basic Hardboard 2012 (Reaffirmed 2020).
- B. ASTM C208 - Standard Specification for Cellulosic Fiber Insulating Board 2022.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022.
- E. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films 2019.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes available; and installation instructions.

**PART 2 PRODUCTS**

**2.01 GENERAL**

- A. Provide materials that are easily removed without damage to the surfaces covered and with the following characteristics:
  - 1. Water resistant.
  - 2. Vapor permeable.
  - 3. Impact resistant.
  - 4. Slip resistant.
  - 5. Flame retardant.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Remove dirt and debris from surfaces to be protected.

**3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Trim or overlap sheet materials to fit area to be covered.
- C. Roll out and cut rolled materials to fit area to be covered.
- D. Tape seams. Avoid taping directly to finished surfaces.
- E. Stretch self-adhering film materials to completely cover surface.
- F. Install door jamb protection to full height of opening.

**3.03 REMOVAL**

- A. Remove protective coverings prior to Date of Substantial Completion. Reuse or recycle materials if possible.

**END OF SECTION 017610**

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**SECTION 017800  
CLOSEOUT SUBMITTALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Project Record Documents.
- B. Operation and Maintenance Data.
- C. Warranties and bonds.

**1.02 RELATED REQUIREMENTS**

- A. Section 013000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 017000 - Execution and Closeout Requirements: Contract closeout procedures.
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

**1.03 SUBMITTALS**

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

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed shop drawings, product data, and samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
  2. Product substitutions or alternates utilized.
  3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
1. Measured depths of foundations in relation to finish first floor datum.
  2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  4. Field changes of dimension and detail.
  5. Details not on original Contract drawings.

### **3.02 OPERATION AND MAINTENANCE DATA**

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

### **3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

- A. For Each Product, Applied Material, and Finish:
  1. Product data, with catalog number, size, composition, and color and texture designations.
  2. Information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
- D. Additional information as specified in individual product specification sections.
- E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

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

- A. For Each Item of Equipment and Each System:
  1. Description of unit or system, and component parts.
  2. Identify function, normal operating characteristics, and limiting conditions.
  3. Include performance curves, with engineering data and tests.
  4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Include color coded wiring diagrams as installed.

- E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
  - 1. Include HVAC outdoor and exhaust air damper calibration strategy.
    - a. Include provisions which ensure that full closure of dampers can be achieved.
  - 2. Include Carbon Dioxide Monitoring Protocol.
  - 3. Include Carbon Monoxide Monitoring Protocol.
  - 4. Include Frost Mitigation Strategy for ventilation heat-recovery system.
- G. Provide servicing and lubrication schedule, and list of lubricants required.
- H. Include manufacturer's printed operation and maintenance instructions.
- I. Include sequence of operation by controls manufacturer.
- J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- K. Provide control diagrams by controls manufacturer as installed.
- L. Provide Contractor's coordination drawings, with color coded piping diagrams as installed.
- M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- O. Include test and balancing reports.
- P. Additional Requirements: As specified in individual product specification sections.

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

- A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate tabbed divider for each system.
- C. Binders: Commercial quality, 8-1/2 by 11 inch (216 by 280 mm) three D side ring binders with durable plastic covers; 2 inch (50 mm) maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
- D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
- E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
- G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
- H. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
- I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- J. Arrangement of Contents: Organize each volume in parts as follows:
  - 1. Project Directory.
  - 2. Table of Contents, of all volumes, and of this volume.

3. Operation and Maintenance Data: Arranged by system, then by product category.
  - a. Source data.
  - b. Product data, shop drawings, and other submittals.
  - c. Operation and maintenance data.
  - d. Field quality control data.
  - e. Photocopies of warranties and bonds.
- K. Coordinate additional requirements with Owner.

### **3.06 WARRANTIES AND BONDS**

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

**END OF SECTION 017800**

**SECTION 017900  
DEMONSTRATION AND TRAINING**

**PART 1 GENERAL**

**1.01 SUMMARY**

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

**1.02 RELATED REQUIREMENTS**

- A. Section 017800 - Closeout Submittals: Operation and maintenance manuals.
- B. Other Specification Sections: Additional requirements for demonstration and training.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
  - 1. Submit not less than four weeks prior to start of training.
  - 2. Revise and resubmit until acceptable.
  - 3. Provide an overall schedule showing all training sessions.
  - 4. Include at least the following for each training session:
    - a. Identification, date, time, and duration.
    - b. Description of products and/or systems to be covered.
    - c. Name of firm and person conducting training; include qualifications.
    - d. Intended audience, such as job description.
    - e. Objectives of training and suggested methods of ensuring adequate training.
    - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
    - g. Media to be used, such as slides, hand-outs, etc.
    - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
  - 1. Include applicable portion of O&M manuals.
  - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
  - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Training Reports:
  - 1. Identification of each training session, date, time, and duration.
  - 2. Sign-in sheet showing names and job titles of attendees.

3. List of attendee questions and written answers given, including copies of and references to supporting documentation required for clarification; include answers to questions that could not be answered in original training session.
- E. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
1. Format: DVD Disc. Verify with Owner.
    - a. Additional Format: USB Flash Drive or Digital download.
  2. Label each disc and container with session identification and date.
  3. Label each recording file with the session identification and date, plus project title.
  4. Audio-video recordings shall be delivered in Mp4 digital format, in minimum 1080 dpi resolution, without compression (other than H-264) applied.
  5. Audio-video recordings shall be edited to eliminate any outtakes or extended interruptions or delays that occur during the presentation, as well as any pre or post presentation preparation or wrap-up activities or conversations.
  6. Deliver all video recordings on a single USB or external hard drive, with a gallery layout or list showing all recorded sessions by title and date, linked to the respective recording for immediate playback when clicked.

#### **1.04 QUALITY ASSURANCE**

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
  2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.
- B. Videographer Qualifications: An established commercial videographer with a min of 5-years experience in recording construction-related audio and video presentations on location.
1. Provide examples of prior work and a minimum of three references in recording training sessions.
  2. Ensure that the video image is stable (employing image stabilization or use of a tripod when appropriate) and composed to include presenter and associated equipment systems.
  3. Ensure audio track records presenter with minimal interference from ambient sound and equipment noise. "Mic-up" the presenter individually to ensure proper sound recording and ask presenter to repeat Q&A questions before answering.
  4. Any audio-video recordings that do not meet the above standards shall be rescheduled and re-recorded, with the original presenter, or an approved alternate.

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

#### **PART 3 EXECUTION**

##### **3.01 DEMONSTRATION - GENERAL**

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

1. Perform demonstrations not less than two weeks prior to Substantial Completion.

### **3.02 TRAINING - GENERAL**

- A. Commissioning Authority will prepare the Training Plan based on draft plans submitted.
- B. Conduct training on-site unless otherwise indicated.
- C. Owner will provide classroom and seating at no cost to Contractor.
- D. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.
- E. Provide training in minimum two hour segments.
- F. The Commissioning Authority is responsible for determining that the training was satisfactorily completed and will provide approval forms.
- G. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- H. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
  1. The location of the O&M manuals and procedures for use and preservation; backup copies.
  2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
  3. Typical uses of the O&M manuals.
- I. Product- and System-Specific Training:
  1. Review the applicable O&M manuals.
  2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
  3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
  4. Provide hands-on training on all operational modes possible and preventive maintenance.
  5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
  6. Discuss common troubleshooting problems and solutions.
  7. Discuss any peculiarities of equipment installation or operation.
  8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
  9. Review recommended tools and spare parts inventory suggestions of manufacturers.
  10. Review spare parts and tools required to be furnished by Contractor.
  11. Review spare parts suppliers and sources and procurement procedures.
- J. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

**END OF SECTION 017900**

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## **SECTION 024100 DEMOLITION**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Building demolition excluding removal of hazardous materials and toxic substances.
- B. Selective demolition of built site elements.
- C. Selective demolition of building elements for alteration purposes.
- D. Abandonment and removal of existing utilities and utility structures.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 003100 - Available Project Information: Existing building survey conducted by Owner; information about known hazardous materials.
- B. Section 011000 - Summary: Limitations on Contractor's use of site and premises.
- C. Section 011000 - Summary: Sequencing and staging requirements.
- D. Section 011000 - Summary: Description of items to be removed by Owner.
- E. Section 011000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
- F. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- G. Section 015713 - Temporary Erosion and Sediment Control.
- H. Section 016000 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- I. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- J. Section 017419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.
- K. Section 026500 - Underground Storage Tank Removal.

#### **1.03 REFERENCE STANDARDS**

- A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2022, with Errata (2021).

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
  - 1. Vegetation to be protected.
  - 2. Areas for temporary construction and field offices.
  - 3. Areas for temporary and permanent placement of removed materials.
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
  - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
  - 2. Identify demolition firm and submit qualifications.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

#### **1.05 QUALITY ASSURANCE**

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
  - 1. Minimum of five years of documented experience.

## **PART 3 EXECUTION**

### **2.01 SCOPE**

- A. Extent of demolition is indicated on drawings.
- B. Remove paving and curbs as required to accomplish new work.
- C. Within area of new construction, remove foundation walls and footings to a minimum of 2 feet (600 mm) below finished grade.
- D. Outside area of new construction, remove foundation walls and footings to a minimum of 2 feet (600 mm) below finished grade.
- E. Remove concrete slabs on grade as indicated on drawings.
- F. Remove manholes and manhole covers, curb inlets and catch basins.
- G. Remove fences and gates.
- H. Additional demolition as indicated on drawings and as required for new work.
- I. Remove other items indicated, for salvage, relocation, and recycling.
- J. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

### **2.02 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with other requirements specified in Section 017000.
- B. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Comply with applicable requirements of NFPA 241.
  - 3. Use of explosives is not permitted.
  - 4. 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.
  - 5. Provide, erect, and maintain temporary barriers and security devices.
  - 6. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
  - 7. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  - 8. Do not close or obstruct roadways or sidewalks without permit.
  - 9. 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.
  - 10. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- C. Do not begin removal until receipt of notification to proceed from Owner.
- D. Do not begin removal until built elements to be salvaged or relocated have been removed.
- E. Do not begin removal until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.
- F. Protect existing structures and other elements that are not to be removed.
  - 1. Provide bracing and shoring.
  - 2. Prevent movement or settlement of adjacent structures.
  - 3. Stop work immediately if adjacent structures appear to be in danger.
- G. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

- H. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- I. Perform demolition in a manner that maximizes salvage and recycling of materials.
  - 1. Comply with requirements of Section 017419 - Waste Management.
  - 2. Dismantle existing construction and separate materials.
  - 3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.
- J. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.
- K. Underground Storage Tanks: Remove and dispose of as specified in Section 026500.

### **2.03 EXISTING UTILITIES**

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; 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.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

### **2.04 SELECTIVE DEMOLITION FOR ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Architect before disturbing existing installation.
  - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Separate areas in which demolition is being conducted from other areas that are still occupied.
  - 1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 015000 in locations as required for project or as directed by Owner.
- C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
- D. Remove existing work as indicated and as required to accomplish new work.
  - 1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
  - 2. Remove items indicated on drawings.
- E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove existing systems and equipment as indicated.
  - 1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.

2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
  3. See Section 011000 for other limitations on outages and required notifications.
  4. Verify that abandoned services serve only abandoned facilities before removal.
  5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.
- F. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
  2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  3. Repair adjacent construction and finishes damaged during removal work.
  4. Patch as specified for patching new work.

## **2.05 DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site; comply with requirements of Section 017419 - Waste Management.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION 024100**

## **SECTION 033300**

### **CAST-IN-PLACE CONCRETE**

#### **PART 1 - GENERAL**

##### **1.1 RELATED DOCUMENTS**

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

##### **1.2 SUMMARY**

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Footings.
  - 2. Slabs-on-grade.
- B. Related Sections include the following:
  - 1. Division 32 Section "Concrete Paving" for concrete pavement and walks.

##### **1.3 DEFINITIONS**

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

##### **1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Samples: For waterstops and vapor retarder.
- E. Qualification Data: For installer, manufacturer and testing agency.
- F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- G. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
  2. Admixtures.
  3. Form materials and form-release agents.
  4. Steel reinforcement and accessories.
  5. Fiber reinforcement.
  6. Waterstops.
  7. Curing compounds.
  8. Floor and slab treatments.
  9. Bonding agents.
  10. Adhesives.
  11. Vapor retarders.
  12. Semi-rigid joint filler.
  13. Joint-filler strips.
  14. Repair materials.
- H. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.
- I. Field quality-control test and inspection reports.
- J. Minutes of pre-installation conference.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
  2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  - 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
  - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Products: Subject to compliance with requirements, provide one of the products specified.
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

### 2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  - 1. Plywood, metal, or other approved panel materials.
  - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
    - a. High-density overlay, Class 1 or better.
    - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
    - c. Structural 1, B-B or better; mill oiled and edge sealed.
    - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

- D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- G. Form-Release Agent: Commercially formulated form-release agent containing VOC's less than 250 grams per liter that will not bond with stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
  - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
  - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
  - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

## 2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

## 2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.
- B. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.
- C. Bar Supports: Use only concrete bricks as supports under rebars (regular rebar chairs not permitted)

## 2.5 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
  - 1. Portland Cement: ASTM C 150, Type I/II gray. Supplement with the following:
    - a. Fly Ash: ASTM C 618, Class C or F.



- b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3M coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
  - 1. Maximum Coarse-Aggregate Size: 1-1/2 inch nominal for foundations, stem walls and slabs on grade; 1 inch nominal for elevated slabs.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Lightweight Aggregate: ASTM C330, 3/4-inch nominal maximum aggregate size.
- D. Water: ASTM C 94/C 94M and potable.

## 2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  - 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

## 2.7 WATERSTOPS

- A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.
  - 1. Available Products:
    - a. Colloid Environmental Technologies Company; Volclay Waterstop-RX.
    - b. Concrete Sealants Inc.; Con Seal CS-231.
    - c. Greenstreak; Swellstop.
    - d. Henry Company, Sealants Division; Hydro-Flex.
    - e. JP Specialties, Inc.; Earthshield Type 20.
    - f. Progress Unlimited, Inc.; Superstop.
    - g. TCMiraDRI; Mirastop.

## 2.8 VAPOR BARRIERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class A vapor retarder with minimum WVTR of 0.008 as tested by ASTM E96 and permeance as tested after mandatory conditioning (ASTM E 154 sections 8,11,12,13) less than 0.01 Perms. Include manufacturer's recommended adhesive or pressure-sensitive tape (minimum width of tape shall be 4 inches). Construct pipe boots from vapor retarder material and pressure sensitive tape per manufacturer's recommendations.
  - 1. Available Products:

- a. Stego Wrap (15 mil) Vapor Barrier by Stego Industries
  - b. Ecoshield-E (15 mil) Epro
  - c. Iron Barr (15 mil) Flatiron Films
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

## 2.9 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.

## 2.10 FLOOR AND SLAB TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces. Apply only to areas scheduled for 'sealed concrete' floor finish. Refer to drawings for location. Protect slab from discoloration prior to applying floor treatment. Clean slab as recommended by floor treatment manufacturer if necessary prior to floor treatment application.
  - 1. Products:
    - a. ChemMasters; Chemsil Plus.
    - b. ChemTec International; ChemTec One.
    - c. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
    - d. Curecrete Distribution Inc.; Ashford Formula.
    - e. Dayton Superior Corporation; Day-Chem Sure Hard.
    - f. Euclid Chemical Company (The); Euco Diamond Hard.
    - g. Kaufman Products, Inc.; SureHard.
    - h. L&M Construction Chemicals, Inc.; Seal Hard.
    - i. SpecChem; SpecHard.

## 2.11 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
- B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- C. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
  - 1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

- D. Reglets: Fabricate reglets of not less than 0.0217-inch- thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- E. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

## 2.12 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
  - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
  - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

## 2.13 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Fly Ash: 20 percent.
  - 2. Combined Fly Ash and Pozzolan: 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
  - 1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

#### 2.14 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Proportion normal-weight concrete mixture for Footings and Piers as follows:
  1. Minimum Compressive Strength: 3000 psi at 28 days or as shown on drawings.
  2. Maximum Water-Cementitious Materials Ratio: 0.57.
  3. Minimum Cementitious Materials Content: 470 lb/cu. yd.
  4. Slump Limit: 6 inches, plus or minus 1 inch.
  5. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
- B. Proportion normal-weight concrete mixture for Slabs-on-Grade as follows:
  1. Minimum Compressive Strength: 3500 psi at 28 days or as shown on drawings.
  2. Maximum Water-Cementitious Materials Ratio: 0.49.
  3. Minimum Cementitious Materials Content: 470 lb/cu. yd.
  4. Slump Limit: 4 inches, plus or minus 1 inch.
  5. Air Content: Do not allow air content of troweled finished slabs to exceed 3 percent.

#### 2.15 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

#### 2.16 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

### PART 3 - EXECUTION

#### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
  2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Install keyways, reglets, recesses, and the like, for easy removal.
  2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
  3. Install dovetail anchor slots in concrete structures as indicated.

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50

deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
  2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

### 3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
  7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: See drawings for locations. Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
  2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

### 3.6 WATERSTOPS

- A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

### 3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  2. Maintain reinforcement in position on chairs during concrete placement.
  3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  4. Slope surfaces uniformly to drains where required.
  5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- H. After a rain event, the contractor must delay concrete placement for slabs on grade until the subgrade is dry. The contractor may use commercial air blowers to remove accumulated water.



### 3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
  - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

### 3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.
  - 1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings or to receive mortar setting beds for ceramic or quarry tile, Portland cement terrazzo, and other bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated, to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces to be exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  2. Finish surfaces to the following tolerances, according to ASTM E 1155 for a randomly trafficked floor surface:
    - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
    - b. Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 31; and of levelness, F(L) 24; for slab-on-grade in atrium lobby.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated or where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.

### 3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

### 3.12 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  - 1. Defer joint filling until concrete has aged at least **six** months. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi-rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.13 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
  - 1. Repair finished surfaces containing defects. Surface defects include spalls, pop-outs, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  - 2. After concrete has cured at least 14 days, correct high areas by grinding.
  - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  - 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  - 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  - 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections, sample materials and prepare test reports.
- B. Inspections:
  1. Steel reinforcement placement.
  2. Steel reinforcement welding.
  3. Headed bolts and studs, hooked anchor bolts and other embedded steel anchors
  4. Monitor addition of water to concrete at job site and length of time concrete is allowed to remain in truck during pour.
  5. Certify each delivery ticket indicating class of concrete delivered (or poured), amount of water added and time at which cement and aggregate were discharged into truck, and time at which concrete was discharged from truck.
  6. Verification of use of required design mixture.
  7. Concrete placement, including conveying and depositing.
  8. Curing procedures and maintenance of curing temperature.
  9. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. Contractors Responsibilities:
  1. Furnish necessary labor to assist testing agency in obtaining and handling samples at job-site.
  2. Advise testing agency in advance of operations to allow for assignment of testing personnel and testing.
  3. Provide and maintain for use of testing agency adequate facilities for proper curing of concrete test specimens on project site in accordance with ASTM C31
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. but less than 25 cu. yd. plus one set for each additional 75 cu. yd. or fraction thereof.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Test to be taken from sample at point of discharge from hose. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method, for normal-weight concrete: one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.
  - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
  - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
  - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
  - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi
10. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
11. Concrete for which strength tests do not meet criteria for acceptance shall be considered inadequate until proven otherwise.
12. Completed concrete work will be accepted when the requirements of ACI 301, Chapter 18 have been complied with.
13. In any case, where strength tests of concrete fail to meet criteria specified herein, Architect shall be sole judge of structural adequacy of concrete. In such case, burden of proof of structural adequacy shall be responsibility of Contractor. Strength evaluation shall conform to requirements of ACI 318. If strength evaluation testing indicates, in opinion of Architect, that structure is of inadequate strength; portions of structure in question shall be repaired or removed and replaced as directed by Architect at no additional expense to Owner. If strength tests fall below specified strength, but not so low as to cause concern for structural adequacy, Architect may request improved conditions of curing or modification of design mixes to improve strength.
14. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
15. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting

agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.

16. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
17. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

- E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 48 hours of finishing.

**END OF SECTION 033300**

**SECTION 033511  
CONCRETE FLOOR FINISHES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface treatments for concrete floors and slabs.
- B. Liquid densifiers and hardeners.
- C. Clear coatings.
- D. Clear penetrating sealers.
- E. Locations are indicated on drawings.
- F. Finish floor elevations and control / expansion joint locations / requirements are indicated on structural and architectural drawings.

**1.02 RELATED REQUIREMENTS**

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 033000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.
- C. Section 033000 - Cast-in-Place Concrete: Curing compounds that also function as sealers.
- D. Section 033000 - Cast-in-Place Concrete: Concrete mix design.

**1.03 REFERENCE STANDARDS**

- A. American Concrete Institute (ACI): ACI 302.1R - Guide for Concrete Floor and Slab Construction.
- B. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
- C. ASTM C 171 - Standard Specification for Sheet Materials for Curing Concrete.
- D. ASTM C 779 - Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.
- E. National Floor Safety Institute (NFSI): NFSI Test Method 101-A - Standard for Evaluating High-Traction Flooring Materials.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with concrete floor placement and concrete floor curing.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
  - 1. VOC content in accordance with Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.
- C. Shop Drawings: Include the following:
  - 1. Plan view of floor and joint pattern layout.
  - 2. Indicate areas to receive each type of surface treatment.
  - 3. Indicate method of protection. Show locations and types of protection.
- D. Samples: For each type of product requiring color selection.
- E. Maintenance Data: Provide data on maintenance and renewal of applied finishes.
- F. Manufacturer's installation instructions.
- G. Concrete Mix Design: Include manufacturer's recommendations for each type of finish.
- H. Letter of certification from the National Floor Safety Institute confirming the system has been tested and passed phase Two Level of certification when tested by Method 101-A. ANSI B-101.1 2009 non-slip properties.



- I. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.
- J. Operation and Maintenance Data: Submit operation and maintenance data for installed products.
  - 1. Manufacturer's instructions on maintenance renewal of applied treatments.
  - 2. Protocols and product specifications for joint filing, crack repair and/or surface repair.
- K. Warranty Documentation: Manufacturer warranty, Installer warranty, and Finish warranty; ensure that forms have been completed in Owner's name and registered with manufacturer.
- L. Specimen Warranty: Manufacturer warranty, Installer warranty, and Finish warranty.

#### **1.06 QUALITY ASSURANCE**

- A. Concrete finishing components and materials shall be from single manufacturer.
- B. Regulatory Requirements: Comply with NFSI Test Method 101-A Phase Two Level High Traction Material.
- C. Pre-installation Meetings: Conduct a pre-installation meeting to verify project requirements, manufacturer's installation instructions and manufacturer's warranty requirements. Review the following:
  - 1. Environmental requirements.
  - 2. Scheduling and phasing of Work.
  - 3. Coordinating with other Work and personnel. Remind all trades that they are working on a surface that is to become a finished surface.
  - 4. Protection of adjacent surfaces.
  - 5. Surface preparation.
  - 6. Repair of defects and defective work prior to installation.
  - 7. Cleaning.
  - 8. Application of liquid hardener, densifier.
  - 9. Protection of finished surfaces after installation.
  - 10. placing of materials on the concrete surface that may cause staining, etching, or scratching.

#### **1.07 MOCK-UP**

- A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.
- B. Mock-Up Size: 10 feet (3 m) square.
- C. Locate where directed.
- D. Mock-up may remain as part of the work.

#### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
- B. Deliver materials in manufacturer's sealed packaging, including application instructions.
- C. Sequence with other Work: Comply with manufacturer's written recommendations for sequencing construction operations.

#### **1.09 FIELD CONDITIONS**

- A. Maintain light level equivalent to a minimum 200 W light source at 8 feet (2.5 m) above the floor surface over each 20 foot (6 m) 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 (10 degrees C) minimum.

#### **1.10 PERFORMANCE REQUIREMENTS**

- A. Use of markers, spray paint and soapstone are prohibited.

- B. Vehicle parking over concrete surfaces is prohibited.
- C. Pipe-cutting operations or other operations over concrete surfaces that may damage surfaces is prohibited.
- D. Ferrous metal storage over concrete surfaces is prohibited
- E. Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over concrete surfaces.
- F. Protect from painting activities over concrete surfaces.
- G. Protect from acids and acidic detergents contacting concrete surfaces.

#### **1.11 WARRANTY**

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a five-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**

#### **2.01 CONCRETE FLOOR FINISH APPLICATIONS**

- A. Liquid Densifier and Hardener:
  - 1. Use at following locations: Sealed concrete floor finish.
- B. Penetrating Clear Sealer:
  - 1. Use at following locations: Sealed concrete floor finish.
- C. Clear Coating:
  - 1. Use at following locations: Sealed concrete floor finish.
- D. Slip Resistant Coating: Finely-ground aggregates added to coatings.
  - 1. Use at following locations: Janitor's closets and mechanical rooms where sealed concrete is specified.

#### **2.02 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.

#### **2.03 DENSIFIERS AND HARDENERS**

- A. Liquid Densifier and Hardener: Penetrating chemical compound that reacts with concrete, filling the pores and dustproofing; for application to concrete after set.
  - 1. Unless otherwise recommended by manufacturer for application.

#### **2.04 COATINGS**

- A. Low Gloss Clear Coating: Transparent, nonyellowing, water- or solvent-based coating.
  - 1. Composition: Acrylic polymer-based.
- B. Clear Coating: Clear coating recommended by manufacturer for finishing concrete floors and slabs.
  - 1. Gloss: Matte.
- C. Penetrating Sealer: Transparent, nonyellowing, water-based coating.
  - 1. Sealed Concrete: Water-based sealer as recommended by manufacturer for application.

#### **2.05 JOINT FILLER**

- A. Joint Filler: Semi-rigid, 2-component, self-leveling, 100% solids, rapid curing, polyurea control joint and crack filler with Shore A 80 or higher hardness.
- B. Color: To be selected by Architect from manufacturer's full range of colors.
  - 1. Design intent is to match adjacent concrete color and finish.

### **PART 3 EXECUTION**

### **3.01 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.
- C. Do not begin installation until substrates have been properly prepared.
  - 1. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Ensure surfaces are clean and free of dirt and other foreign matter harmful to performance of concrete finishing materials.
- E. Examine surface to determine soundness of concrete for polishing.

### **3.02 GENERAL**

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

### **3.03 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.

### **3.04 ADJUSTMENT AND CLEANING**

- A. Remove defects and re-polish defective areas.
- B. Re-polish those areas not meeting specified gloss levels of the approved mock-up.
- C. Neutralize and clean polished floor surfaces.
- D. Upon completion, remove surplus and excess materials, rubbish, tools, and equipment.

### **3.05 PROTECTION**

- A. Protect installed product from damage during construction in accordance with manufacturer's recommendations.

**END OF SECTION 033511**

**SECTION 034100  
PRECAST STRUCTURAL CONCRETE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Precast structural concrete stair treads and landings with commercial architectural finish.
- B. Connection devices.

**1.02 RELATED REQUIREMENTS**

- A. Section 055000 - Metal Fabrications.
- B. Section 055100 - Metal Stairs: Structural stair support framing.

**1.03 REFERENCE STANDARDS**

- A. ACI 318 - Building Code Requirements for Structural Concrete 2019, with Errata (2021).
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2019.
- D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.
- E. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- F. IAS AC157 - Accreditation Criteria for Fabricator Inspection Programs for Reinforced and Precast/Prestressed Concrete 2017.
- G. PCI MNL-116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products 2021.
- H. PCI MNL-120 - PCI Design Handbook 2017, with Errata (2021).

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a pre-installation conference one week prior to commencing work of this section.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate standard component configurations, design loads, deflections, cambers, and bearing requirements.
- C. Shop Drawings: Indicate layout, unit locations, fabrication details, unit identification marks, reinforcement, connection details, support items, dimensions, openings, and relationship to adjacent materials. Indicate design loads, deflections, cambers, bearing requirements, and special conditions.
  - 1. Manufacturer's Installation Details.
  - 2. Indicate joints, reveals, and extent and location of each surface finish.
  - 3. Indicate shim sizes and grouting sequence.
  - 4. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- D. Design Data: Submit design data reports indicating calculations for loadings and stresses of fabricated, designed framing.
- E. Designer's Qualification Statement.
- F. Fabricator's Qualification Statement.
- G. Samples for initial selection: Manufacturer's color and finish charts.
- H. Samples for verification:

1. For each type of finish indicated on exposed surfaces of precast structural concrete units with architectural finish, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately 12 inches by tread width and depth.
- I. Maintenance Data: Provide data on maintenance and renewal of applied finishes.
- J. Warranty Documentation: Manufacturer warranty, Installer warranty, and Finish warranty; ensure that forms have been completed in Owner's name and registered with manufacturer.

#### **1.06 EXTRA MATERIALS**

- A. Provide a minimum of two extra treads, full length of stair.

#### **1.07 QUALITY ASSURANCE**

- A. Designer Qualifications: Design precast concrete members under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in the State in which the Project is located.
- B. Fabricator Qualifications: Company specializing in manufacturing products specified in this section, with not less than twenty years of documented experience.
- C. Installer's qualifications: Installer shall have ten years minimum experience.

#### **1.08 MOCK-UP**

- A. Mockups: After sample approval but before production of precast structural concrete units with architectural finish, construct full-sized mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  1. Build mock-up as indicated on Drawings including sealants, fasteners and precast structural concrete units with an architectural finish complete with anchors, connections, and joint fillers.
  2. Approval of mock-ups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  3. Approved mock-ups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### **1.09 DELIVERY, STORAGE, AND HANDLING**

- A. Handle precast members in position consistent with their shape and design. Lift and support only from support points.
- B. Protect members to prevent staining, chipping, or spalling of concrete.
- C. Mark each member with date of production and final position in structure.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Precast Concrete:
  1. Basis of Design: Empire Precast; [www.empireprecast.net](http://www.empireprecast.net).
  2. Subject to compliance with requirements, other manufacturers offering similar products and finishes may be considered.
    - a. Substitutions: See Section 016000 - Product Requirements.

#### **2.02 PRECAST UNITS**

- A. Precast Structural Concrete Units: Comply with PCI MNL-116, PCI MNL-120, PCI MNL-123, PCI MNL-135, ACI 318 and applicable codes.
  1. Design components to withstand dead loads and design loads in the configuration indicated on drawings and as follows:
  2. Calculate structural properties of framing members in accordance with ACI 318.
  3. Design system to accommodate construction tolerances, deflection of other building structural members and clearances of intended openings.

#### **2.03 MATERIALS**

- A. Cement: Gray Portland type, complying with ASTM C150/C150M, Type III.
- B. Aggregate, Sand, Water, Admixtures: Determined by precast fabricator as appropriate to design requirements and PCI MNL-116.

## **2.04 REINFORCEMENT**

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).
  - 1. Galvanized in accordance with ASTM A767/A767M, Class I.
- B. Steel Welded Wire Reinforcement: ASTM A1064/A1064M deformed type; in flat sheets; unfinished.

## **2.05 FABRICATION**

- A. Comply with fabrication procedures specified in PCI MNL-116.
- B. Maintain plant records and quality control program during production of precast members. Make records available upon request.
- C. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are embedded and located as indicated on shop drawings.

## **2.06 FINISHES**

- A. Ensure exposed-to-view finish surfaces of precast concrete members are uniform in color and appearance.
- B. As selected from manufacturer's full range of colors and finishes.

## **2.07 ACCESSORIES**

- A. Connecting and Supporting Devices; Anchors and Inserts: Plates, angles, items cast into concrete, and inserts as follows:
  - 1. Material: Carbon steel complying with ASTM A36/A36M.
  - 2. Finish: Prime painted, except where device surfaces will be in contact with concrete or will require field welding.
  - 3. As required for application.
- B. Bolts, Nuts and Washers: As required for application.

## **2.08 SOURCE QUALITY CONTROL**

- A. Section 014000 - Quality Requirements: Provide mix design for concrete.

# **PART 3 EXECUTION**

## **3.01 EXAMINATION**

- A. Verify that site conditions are ready to receive work and field measurements are as indicated on shop drawings.

## **3.02 PREPARATION**

- A. Prepare support equipment for the erection procedure, temporary bracing, and induced loads during erection.

## **3.03 ERECTION**

- A. Erect members without damage to structural capacity, shape, or finish. Replace or repair damaged members.
- B. Align and maintain uniform horizontal and vertical joints, as erection progresses.

## **3.04 TOLERANCES**

- A. Erect members level and plumb within allowable tolerances.

## **3.05 PROTECTION**

- A. Protect members from damage caused by field welding or erection operations.
- B. Provide non-combustible shields during welding operations.
- C. Use of markers, spray paint and soapstone are prohibited.

- D. Pipe-cutting operations or other operations over concrete surfaces that may damage surfaces is prohibited.
- E. Ferrous metal storage over concrete surfaces is prohibited.
- F. Protect from petroleum, oil, hydraulic fluid, or other liquid dripping from equipment working over concrete surfaces.
- G. Protect from painting activities over concrete surfaces.
- H. Protect from acids and acidic detergents contacting concrete surfaces.

**3.06 CLEANING**

- A. Clean weld marks, dirt, or blemishes from surface of exposed members.

**END OF SECTION 034100**

**SECTION 035113  
CEMENTITIOUS ROOF DECK**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Cementitious wood fiber plank roof deck and form system.
  - 1. Locations are indicated on drawings: Tectum / Structural Acoustical Roof Deck.

**1.02 RELATED REQUIREMENTS**

- A. Section 016116 – Volatile Organic Compound (VOC) Content Restrictions: Adhesive requirements.
- B. Section 075400 – Thermoplastic Membrane Roofing.
- C. Section 099123 - Interior Painting: Field painting of underside of roof deck.
- D. Section 133419 - Metal Building Systems: Support framing for roof deck.

**1.03 REFERENCE STANDARDS**

- A. ASTM C177 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- B. ASTM C518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- C. ASTM D1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- D. ASTM D2842 Standard Test Method for Water Absorption of Rigid Cellular Plastics.
- E. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
- F. UL 580 Standard for Safety for Tests for Uplift Resistance of Roof Assemblies.

**1.04 SYSTEM DESCRIPTION**

- A. Design Requirements: Provide roof deck assembly designed and tested according to the following:
  - 1. Underwriters Laboratories UL 580 (UL Class 90 Design).
    - a. Unless more stringent conditions are indicated on drawings.
- B. Performance Requirements:
  - 1. Provide a roof deck system that has been manufactured, fabricated and installed to meet shear, deflection and uplift requirements in accordance with criteria indicated on drawings.

**1.05 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

**1.06 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit manufacturer's product data and installation instructions.
  - 1. Include manufacturer's product design tables and calculations indicating the required structural shear, uplift and deflection criteria is met or exceeded.
- C. Shop Drawings: Provide drawings indicating locations and spacing of planks and purlins.
  - 1. Include field verified locations for all existing conditions.
  - 2. Show support framing for all transitions of the roof.
- D. Samples: Submit selection and verification samples as follows:
  - 1. Set of 6-inch square samples for each wood fiber deck unit required, showing full range of exposed texture to be expected in completed work.
  - 2. Labeled set of all accessories required for a complete installation.
- E. Quality Assurance / Control Submittals: Submit the following:
  - 1. Test Reports: Submit certified test reports from recognized test laboratories.

**1.07 QUALITY ASSURANCE**



- A. Installer Qualifications: Company specializing in performing work of the type specified and with at least ten years of documented experience.

## **1.08 WARRANTY**

- A. Manufacturer's Warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights Owner may have under contract documents.
  - 1. Warranty Period: 15 years beginning with date of substantial completion.

## **PART 2 PRODUCTS**

### **2.01 ROOF DECK AND FORM SYSTEMS**

- A. Basis-of-Design: Tectum Inc. (Armstrong world Industries): [www.tectum.com](http://www.tectum.com).
  - 1. Cementitious deck form board systems, including the following configurations:
    - a. Tectum Roof Deck Plank.
      - 1) Type: E-N.
  - 2. Substitutions: See Section 016000 - Product Requirements.

### **2.02 REGULATORY REQUIREMENTS**

- A. Comply with applicable codes.

### **2.03 ROOF DECK PANEL COMPONENTS**

- A. Cementitious deck form board products, including the following:
  - 1. Material: Aspen wood fibers bonded with inorganic hydraulic cement, bonded to NEOPOR® expanded polystyrene (EPS) foam insulation, bonded to top surface of 7/16 inch (11.1 mm) Fire-retardant treated (FRT) oriented strand board (OSB).
  - 2. Nominal Total Panel Thickness: 7-1/4".
    - a. R 29.56 actual; Minimum R-Value: R-25.
    - b. Weight PSF: 5.2.
  - 3. OSB meets Voluntary Product Standard PS2-10 Performance Standard for Wood-Based Structural-Use Panels.
  - 4. EPS Core Compliance (ASTM C578): Exceeds Type I.
  - 5. EPS Classification: Bears UL classification mark.
  - 6. EPS Nominal Density: 1.0 pcf (16.02 kg/m3).
  - 7. EPS Thermal Resistance (ASTM C518 at 25 degrees F (-3.89 degrees C)): 4.90 per inch.
  - 8. EPS Thermal Resistance (ASTM C518 at 40 degrees F (4 degrees C)): 4.70 per inch.
  - 9. EPS Thermal Resistance (ASTM C518 at 75 degrees F (24 degrees C)): 4.30 per inch.

### **2.04 ACCESSORIES**

- A. Provide accessories as follows:
  - 1. Tectum Screws:
    - a. Material: Steel.
    - b. Sizes as recommended by manufacturer and as required by project.
  - 2. Low VOC Adhesive:
    - a. As recommended by manufacturer.
  - 3. Support framing for all transitions of the roof as required by manufacturer.
  - 4. Additional accessories as recommended by manufacturer and as required for project.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Comply with the instructions and recommendations of the roof deck panel manufacturer.
- B. Site Verification of Conditions:
  - 1. Verify that site conditions are acceptable for installation of roof deck panel system.
    - a. Notify architect / engineer of existing structural conditions that are damaged and would require repair or further analysis.

2. Do not proceed with installation of roof deck panel system until unacceptable conditions are corrected.

### **3.02 PREPARATION**

- A. As recommended by manufacturer.

### **3.03 INSTALLATION**

- A. Roof Deck Plank Installation:
  1. Place planks on joists with square cut ends butted tightly together.
    - a. Stagger end joints.
    - b. Tectum panels must be supported by bent plates (steel or other support) at all transitions of the roof. This includes but is not limited to the ridge, valleys, perimeter and panel direction change. Panels must have a minimum of 1 inch bearing and should be glued and screwed at these transitions.
    - c. Panel ends must fall over structural supports and have a minimum of 1 inch bearing.
  2. Secure planks to roof purlins with screws and spacing designed to meet diaphragm shear and uplift requirements.
  3. Do not allow foot traffic on planks until after screws are installed.
  4. Apply adhesive recommended by manufacturer to ensure diaphragm performance as designed.

### **3.04 CLEANING**

- A. Clean exposed surfaces of all deck surfaces.
- B. Remove and replace work that cannot be successfully repaired to eliminate evidence of structural damage.

### **3.05 PROTECTION**

- A. Protect installed work from damage due to weather related moisture.
- B. Protect installed work from damage due to subsequent construction activity on the site so that the work will be without damage and deterioration at the time of acceptance by the Owner.

**END OF SECTION 035113**

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**SECTION 035216**  
**LIGHTWEIGHT INSULATING CONCRETE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Insulating concrete fill over structural vented roof decking.
  - 1. This Section includes cast-in-place cellular type lightweight insulating concrete for roof decks.
- B. Perimeter joint filler.

**1.02 RELATED REQUIREMENTS**

- A. Division 6 - Rough Carpentry: Plywood Sheathing.
- B. Division 7 - Roofing, Specialties and Accessories.

**1.03 REFERENCE STANDARDS**

- A. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.
- B. ASTM C138/C138M - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete 2017a.
- C. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- D. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.
- E. ASTM C332 - Standard Specification for Lightweight Aggregates for Insulating Concrete 2017.
- F. ASTM C495/C495M - Standard Test Method for Compressive Strength of Lightweight Insulating Concrete 2012 (Reapproved 2019).
- G. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.
- H. ASTM C796/C796M - Standard Test Method for Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam 2019.
- I. ASTM C869/C869M - Standard Specification for Foaming Agents Used in Making Preformed Foam for Cellular Concrete 2011 (Reapproved 2016).
- J. FM (AG) - FM Approval Guide current edition.
- K. ITS (DIR) - Directory of Listed Products Current Edition.
- L. UL (DIR) - Online Certifications Directory Current Edition.

**1.04 DEFINITIONS**

- A. Lightweight Insulating Concrete: Low-density concrete, with an oven-dry unit weight not exceeding 50 lb/cu. ft. placed with embedded rigid insulation board.

**1.05 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

**1.06 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate layout of slopes, drain locations, and interruptions.
  - 1. Include plans, sections, and details showing roof slopes, lightweight insulating concrete thicknesses, embedded insulation board, roof penetrations, roof perimeter terminations and curbs, control and expansion joints, and roof drains.
- C. Product Data: Provide physical characteristics, thermal values, product limitations and installation instructions.
- D. Certificates: Certify that products of this section meet or exceed specified requirements and that densities and indicated thicknesses have been achieved.

- E. Manufacturer's Installation Instructions: Indicate mix instructions.
- F. Design mixtures.
- G. Research/evaluation reports for lightweight insulating concrete.
- H. Field quality control test reports.
- I. Product certificates.
  - 1. For foaming agents.
  - 2. For admixtures,
  - 3. For molded-polystyrene insulation board.

## **1.07 QUALITY ASSURANCE**

- A. Installer Qualifications: An Installer who employs and retains, throughout the project, supervisors who are trained and approved by manufacturer.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least ten years of documented experience .

## **1.08 FIELD CONDITIONS**

- A. Place insulating concrete in accordance with lightweight aggregate manufacturer's instructions.
- B. Do not place insulating concrete mix at ambient temperatures lower than 32 degrees F.
- C. Coordinate the roofing membrane application to avoid prolonged exposure of the roof deck.
- D. Do not place lightweight insulating concrete during rain or snow or on surfaces covered with standing water, snow, or ice.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Lightweight Insulating Concrete:
  - 1. Basis-of-Design: Elastizell Corp. of America: [www.elastizell.com/#sle](http://www.elastizell.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.

### **2.02 REGULATORY REQUIREMENTS**

- A. Comply with applicable codes for combustibility requirements.

### **2.03 MATERIALS**

- A. Cement: ASTM C150/C150M, Portland Type I - Normal, gray color.
- B. Lightweight Aggregate: ASTM C332; Group I, perlite.
- C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.
- D. Foaming Agent: Comply with ASTM C869/C869M, when tested according to ASTM C796/C796M.
- E. Air-Entraining Admixture: ASTM C 260.
- F. Molded-Polystyrene Insulation Board: ASTM C 578, provide units with keying slots of approximately 3 percent of board's gross surface area, type I, 0.90-lb/cu. ft. minimum density

### **2.04 CONCRETE MIX**

- A. Produce cellular lightweight insulating concrete with the following minimum physical properties using cementitious materials, air-producing liquid-foaming agents, and the minimum amount of water necessary to produce a workable mix.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Elastizell Corporation of America or comparable product submitted for approval during the bid process.
    - a. Subject to requirements specified in Section 012500 - Substitution Requirements.
  - 2. As-Cast Unit Weight: 34-42lb/cu. ft. (range II) is typical for this type of application lb/cu. ft. at point of placement, when tested according to ASTM C 138/C 138M.

3. Oven-Dry Unit Weight: 26-34lb/cu. ft. (range II) is typical for this type of application +/- 3 lb/cu. ft., when tested according to ASTM C 495.
  4. Compressive Strength: Minimum 200 psi, when tested according to ASTM C 495.
- B. Test for compressive strength in accordance with ASTM C495/C495M, for wet density in accordance with ASTM C138/C138M, and for dry density after oven drying.

## **2.05 ACCESSORIES**

- A. As recommended by manufacturer for application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify joints in precast roof members are grouted or taped to prevent seepage of wet insulating concrete.
- B. Verify roof deck is free of standing water, dirt, debris, ice, or other detrimental materials.
- C. Verify roof slopes and elevations are as shown on the drawings and ready to receive insulating concrete.
- D. Notify Architect immediately of conditions that would prevent correct and timely installation.
- E. Do not proceed with work until detrimental conditions have been corrected.

### **3.02 PREPARATION**

- A. Install 1 inch (25 mm) thick expansion joint filler at:
  1. Perimeter of roof decking.
  2. Around penetrations through deck.
  3. Every 100 ft (30 m) of deck surface dimension.
    - a. Unless more stringent conditions are recommended by manufacturer.
  4. Each change of deck direction on metal roof deck surfaces.
- B. As recommended by manufacturer.

### **3.03 INSTALLATION**

- A. Slurry deck surface; place insulation; use mix to fill holes and breaks.
- B. Place insulating concrete and screed surface to achieve minimum 2 inch (50 mm) thickness.
- C. Mix and place lightweight insulating concrete according to manufacturer's written instructions, using equipment and procedures to avoid segregation of mixture and loss of air content.
- D. Slope top surface to 1/4 inch/foot (1:50) for roof surface drainage.
  1. Unless more stringent conditions are indicated on drawings or required by manufacturer.
- E. Install insulation board according to lightweight insulating concrete manufacturer's written instructions. Place insulation board in wet, lightweight insulating concrete slurry poured a minimum of 1/8 inch over the structural substrate. Ensure full contact of insulation board with slurry. Stagger joints and tightly butt insulation boards.
- F. Deposit and screed lightweight insulating concrete in a continuous operation until an entire panel or section of roof area is completed. Do not vibrate or work mix except for screeding or floating.
- G. Finish top surface smooth, free of ridges and depressions, and maintain surface in condition to receive subsequent roofing system.
- H. Protect the insulating concrete roof deck from construction traffic.

### **3.04 CURING**

- A. Cure in accordance with lightweight aggregate manufacturer's instructions.
- B. Protect insulating concrete from excess evaporation of surface moisture.

### **3.05 FIELD QUALITY CONTROL**

- A. Material Testing: Manufacturer shall perform testing and submit the results.

- B. Testing Procedures: Check the cast density at the point of placement and adjust the mix design to obtain the required cast density. A minimum of 4 test specimens (3 inch by 6 inch cylinders) shall be sampled at the point of placement daily for each 100 cubic yards of material placed. Protect samples from damage and temperature extremes and test according to ASTM C796. Compressive test samples shall NOT be oven-dried prior to testing.

### **3.06 DEFECTIVE WORK**

- A. Refinish, or remove and replace, lightweight insulating concrete if surfaces are excessively scaled or too rough to receive roofing according to roofing membrane manufacturer's written requirements.
- B. Remove and replace lightweight insulating concrete that fails to comply with requirements.

**END OF SECTION 035216**

**SECTION 042000  
UNIT MASONRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete block.
- B. Clay facing brick.
- C. Mortar and grout.
- D. Reinforcement and anchorage.
- E. Flashings.
- F. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 055000 - Metal Fabrications: Loose steel lintels and Fabricated steel items.
- B. Section 072100 - Thermal Insulation: Insulation for cavity spaces.
- C. Section 072500 - Weather Barriers: Water-resistive barriers or air barriers applied to the exterior face of the backing sheathing or masonry.
- D. Section 078400 - Firestopping: Firestopping at penetrations of fire-rated masonry and at top of fire-rated walls.
- E. Section 079200 - Joint Sealants: Sealing control and expansion joints.

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- C. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire 2019.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- E. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement 2016, with Editorial Revision (2018).
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.
- G. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units 2022.
- H. ASTM C91/C91M - Standard Specification for Masonry Cement 2018.
- I. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units 2017.
- J. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- K. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2018.
- L. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale) 2022.
- M. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- N. ASTM C404 - Standard Specification for Aggregates for Masonry Grout 2018.
- O. ASTM C476 - Standard Specification for Grout for Masonry 2022.
- P. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane 2015 (Reapproved 2021).
- Q. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.



- R. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls 2017.
- S. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls 2005.
- T. BIA Technical Notes No. 46 - Maintenance of Brick Masonry 2017.
- U. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.
- V. UL (FRD) - Fire Resistance Directory Current Edition.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

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

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
  - 1. Include all product data associated with this section in a single submittal.
- C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
  - 1. Include calculations or selections from the manufacturer's prescriptive design tables that indicate compliance with the applicable building code and project conditions.
  - 2. Include the design engineer's stamp or seal on each sheet of shop drawings.
  - 3. Show full elevations of reinforced walls. Segments or parts will be rejected without review.
- D. Samples: Submit four samples of facing brick units to illustrate color, texture, and extremes of color range.
- E. Samples: For each type of colored mortar.
- F. Mix Designs: For each type of mortar and grout. Include descriptions and proportions of ingredients.
  - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109 for compressive strength.
  - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- G. Accessories embedded in the masonry.
  - 1. Submit letter of compatibility where different manufacturers are used within a single system.
- H. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
- I. 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.
- J. Test Reports: Concrete masonry manufacturer's test reports for units with integral water repellent admixture.
- K. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- L. Designer's Qualification Statement.
- M. Manufacturer's Qualification Statement.
- N. Installer's Qualification Statement.
- O. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.

- P. Order Verification: Place brick order within 21 days of contract award. Submit written statement to Architect documenting that the specified brick types for the project have been ordered and that quantities ordered match those required for project. Architect will not verify quantities.

## **1.06 QUALITY ASSURANCE**

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
  - 1. Maintain one copy of each document on project site.
- B. Fire Rated Assemblies: Comply with applicable code for UL (FRD) Assembly No. as indicated on drawings.
- C. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- D. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum ten years of documented experience.
- E. Installer Qualifications: Company specializing in performing work of the type specified and with at least 10 years of documented experience.
- F. Obtain flashing and accessory products from same manufacturer, to the fullest extent possible.
- G. The use of building paper or felt as flashing material is not allowed.

## **1.07 MOCK-UP**

- A. Construct a masonry wall as a mock-up panel sized 12 feet (3.6 m) long by 12 feet (3.6 m) high, minimum; include mortar, accessories, structural backup, flashings (with lap joint, corner, and end dam), and control joint in mock-up. Include at least one outside and inside corner. Include all bonding patterns indicated on drawings in mock-up.
  - 1. Construct one mock-up for each brick type indicated.
- B. Locate at Contractor's option.
- C. Mock-up may remain as part of the Work.
- D. Refer to Section 014000 - Quality Requirements for Integrated Exterior Mock-up requirements.

## **1.08 DELIVERY, STORAGE, AND HANDLING**

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

# **PART 2 PRODUCTS**

## **2.01 CONCRETE MASONRY UNITS**

- A. Concrete Block: Comply with referenced standards and as follows:
  - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches (400 by 200 mm) and nominal depth of 8 inches (200 mm).
    - a. Provide nominal 16 by 8 inch with nominal depth of 6 inches at interior locations where indicated on drawings.
    - b. Provide nominal 16 by 8 inch with nominal depth of 12 inches where indicated on drawings.
    - c. Provide additional sizes as required for infill and as required for project.
  - 2. Special Shapes: Provide non-standard blocks configured for corners, lintels, headers, control joint edges, curved, and other detailed conditions.
    - a. Provide square-edged units for outside corners at exterior and concealed interior locations.
    - b. Provide bullnose corners at interior corner locations, where exposed to view, unless adjacent to gypsum board or tile.
    - c. Provide alternating edges of square and bullnose on same unit as required for application.
  - 3. Load-Bearing Units: ASTM C90, normal weight.

- a. Both hollow and solid block.
  - b. Exposed Faces: Manufacturer's standard color and texture.
  - c. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1,900 PSI unless otherwise indicated on drawings.
  - d. Density Classification:
    - 1) Normal weight below grade unless otherwise indicated on Contract Drawings.
    - 2) Lightweight above grade unless otherwise indicated on Contract Drawings.
  - e. Size (Width): Manufacturer's standard units with nominal face dimensions of 16 inches long x 8 inches high.
    - 1) Manufactured to dimensions 3/8 inch less than nominal dimensions.
4. Non-Loadbearing Units: ASTM C129.
- a. Both hollow and solid block.
  - b. Normal weight.

## 2.02 BRICK UNITS

- A. Manufacturers:
  - 1. Acme Brick; [www.brick.com](http://www.brick.com).
  - 2. Substitutions: See section 016000 - Product Requirements.
- B. Facing Brick: ASTM C216, Type FBX, Grade SW.
  - 1. Texture: Velour.
  - 2. Size: Modular.
  - 3. Brick type locations and patterns are indicated on drawings.
  - 4. Actual size: 2 1/4 inches tall and 7 5/8 inches long, with a bed depth of 3 5/8 inches.
  - 5. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.
    - a. Provide solid units at all sills and at all accent brick where accent is over 1/4 inch from face of wall and as required for application.
      - 1) Unless more stringent conditions are indicated on drawings.
      - 2) Exposed holes, cores, or frogs are not allowed. Use solid units where installation would result in exposed holes, cores, or frogs.
    - b. Provide custom fabricated radiused brick where curves or radiused installation is indicated.

## 2.03 MORTAR AND GROUT MATERIALS

- A. Masonry Cement: ASTM C91/C91M, Type S.
  - 1. Colored Mortar: Premixed cement as required to match Architect's color sample.
    - a. Color for CMU: Standard Gray.
  - 2. Manufacturers:
  - 3. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Ash Grove (a CRH / Oldcastle company), Muskogee, OK 918-683-3003.
    - b. Spec Mix; [www.specmix.com](http://www.specmix.com).
    - c. Substitutions: See Section 016000 - Product Requirements.
- B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- E. Hydrated Lime: ASTM C 207, Type S.
- F. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- G. Grout Aggregate: ASTM C404.

H. Water: Clean and potable.

## **2.04 REINFORCEMENT AND ANCHORAGE**

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa), deformed billet bars; galvanized.
- B. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- C. Single Wythe Joint Reinforcement: ASTM A951/A951M.
  - 1. Type: Truss or ladder.
  - 2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
  - 3. Size: 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not less than 5/8 inch (16 mm) of mortar coverage on each exposure.
- D. Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
  - 1. Type: Truss.
  - 2. Material: ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M Class 3.
  - 3. Size: 0.1483 inch (3.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods; width as required to provide not less than 5/8 inch (16 mm) of mortar coverage on each exposure.
- E. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
  - 1. Type: Truss, with adjustable ties or tabs spaced at 16 in (406 mm) on center.
  - 2. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M Class B.
  - 3. Size: 0.1875 inch (4.8 mm) side rods with 0.1483 inch (3.8 mm) cross rods and adjustable components of 0.1875 inch (4.8 mm) wire, width of components as required to provide not less than 5/8 inch (16 mm) of mortar coverage from each masonry face.
  - 4. Vertical adjustment: Not more than 1 1/4 inches (32 mm).
  - 5. Seismic Feature: Provide lip, hook, or clip on extended leg of wall ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch (3.8 mm) diameter.
  - 6. Insulation Clips: Provide clips at tabs or ties designed to secure insulation against outer face of inner wythe of masonry.
- F. Strap Anchors: Bent steel shapes, 1-1/2 inch (38 mm) width, 0.105 inch (2.7 mm) thick, 24 inch (610 mm) length, with 1-1/2 inch (38 mm) long, 90 degree bend at each end to form a U or Z shape or with cross pins, hot dip galvanized to ASTM A153/A153M Class B.
- G. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not less than 5/8 inch (16 mm) of mortar coverage from masonry face.
  - 1. Concrete frame: Dovetail anchors of bent steel strap, nominal 1 inch (25 mm) width x 0.024 in (0.61 mm) thick, with trapezoidal wire ties 0.1875 inch (4.75 mm) thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
  - 2. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch (6.3 mm) thick, with trapezoidal wire ties 0.1875 inch (4.75 mm) thick, hot dip galvanized to ASTM A 153/A 153M, Class B.
- H. Two-Piece Wall Ties: Formed steel wire, 0.1875 inch (4.8 mm) thick, adjustable, eye and pintle type, hot dip galvanized to ASTM A 153/A 153M, Class B, sized to provide not less than 5/8 inch (16 mm) of mortar coverage from masonry face and to allow vertical adjustment of up to 1-1/4 in (32 mm).
- I. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
  - 1. Anchor plates: Not less than 0.075 inch (1.91 mm) thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.

2. Wire ties: Manufacturer's standard shape, 0.1875 inch (4.75 mm) thick.
  3. Vertical adjustment: Not less than 3-1/2 inches (89 mm).
  4. Seismic Feature: Provide lip, hook, or clip on end of wire ties to engage or enclose not less than one continuous horizontal joint reinforcement wire of 0.1483 inch (3.8 mm) diameter.
- J. Metal-to-Metal Fasteners: Self-drilling, self-tapping screws; corrosion resistant finish or hot dip galvanized to ASTM A153/A153M.

## **2.05 FLASHINGS**

- A. Metal Flashing Materials:
1. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gage, 0.0187 inch (0.48 mm) thick; finish 2B to 2D.
    - a. Provide hemmed edges at all exposed flashing.
  2. Prefabricated Metal Flashing: Smooth fabricated 12 oz/sq ft (3.66 kg/sq m) flashing for surface mounted conditions.
    - a. Where indicated or required.
    - b. Provide hemmed edges at all exposed flashing. Finish all sides, where exposed to view.
- B. Membrane Asphaltic Flashing Materials:
1. Rubberized Asphalt Flashing: Self-adhering polymer modified asphalt sheet; 40 mils (0.040 inch) (1.0 mm) minimum total thickness; 8 mil (0.20 mm) cross-laminated polyethylene bonded to adhesive rubberized asphalt, with a removable release liner.
- C. Membrane Non-Asphaltic Flashing Materials:
1. Composite Polymer Flashings - Self-Adhering: Composite polyethylene; 40 mil (1mm) thick with pressure-sensitive adhesive and release paper.
  2. EPDM Flashing: ASTM D4637/D4637M, Type I, 0.040 inch (1.0 mm) thick.
- D. Factory-Fabricated Flashing Corners and End Dams: Material compatible with and approved by through-wall flashing manufacturer.
- E. 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.
- F. Termination Bars: Stainless steel with foam seal; compatible with membrane and adhesives.
- G. Drip Edge: Stainless steel; angled drip with hemmed edge; compatible with membrane and adhesives.
  1. Finish all sides where exposed to view.
- H. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

## **2.06 ACCESSORIES**

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
- B. Joint Filler: Closed cell rubber; oversized 50 percent to joint width; self expanding; in maximum lengths available.
- 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.
- D. Weeps:
1. Type: Molded PVC grilles, insect resistant.
    - a. Flexible, UV resistant, sized to fill head joints, full height and depth 1/8" less than depth of outer wythe.
  2. Color(s): As selected by Architect from manufacturer's full range.

- a. Design intent is to match mortar color, as close as possible.
- E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

## **2.07 MORTAR AND GROUT MIXING**

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
  - 1. Use Type S mortar for all locations, unless otherwise indicated.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. New Mortar for Old Brick: Proportion by volume only; no more than 20 percent of the total volume of Portland cement and lime combined to be Portland cement.
  - 1. Sand: Match original mortar as closely as possible in color, size, and texture, without use of other additives.
  - 2. Repointing Mortar: Use proportions from 1 part lime to 2 parts sand with no Portland cement, up to 2 parts Portland cement to 3 parts lime to 6 parts sand.
  - 3. White Portland Cement: Use for repointing mortar where Portland cement is permitted.
  - 4. Use mortar within 30 minutes after final mixing; do not add more water after the initial mix is prepared.
- D. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches (50 mm) or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches (50 mm).
- E. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- F. Mixing: Use mechanical batch mixer and comply with referenced standards.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

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

### **3.02 PREPARATION**

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

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

- A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

### **3.04 COURSING**

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
  - 1. Bond: Running.
  - 2. Coursing: One unit and one mortar joint to equal 8 inches (200 mm).
  - 3. Mortar Joints: Concave.
- D. Brick Units:
  - 1. Bond: As indicated for different locations.
  - 2. Coursing: Three units and three mortar joints to equal 8 inches (200 mm).
  - 3. Mortar Joints: Concave.

### **3.05 PLACING AND BONDING**

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- F. Interlock intersections and external corners, except for units laid in stack bond.
- 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.
  - 1. Do not install chipped or broken masonry.
- I. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.
- J. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- K. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

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

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

### **3.07 CAVITY MORTAR CONTROL**

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions.
  - 1. Verify that airspace width is no more than 3/8 inch (9 mm) greater than panel thickness.
  - 2. Hold cavity mortar control panel tight to face wythe.
  - 3. Install horizontally between joint reinforcement.
  - 4. Stagger end joints in adjacent rows.
  - 5. Fit to perimeter construction and penetrations without voids.
- D. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

### **3.08 REINFORCEMENT AND ANCHORAGE - GENERAL AND CAVITY WALL MASONRY**

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches (400 mm) on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches (400 mm) each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch (16 mm) mortar cover on each side.
- E. Lap joint reinforcement ends minimum 6 inches (150 mm).
- F. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches (400 mm) on center.

- G. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches (900 mm) horizontally and 24 inches (600 mm) vertically.
- H. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches (38 mm) with at least 5/8 inch (16 mm) mortar cover to the outside face of the anchor.

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

- A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches (400 mm) on center vertically and 36 inches (900 mm) on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches (200 mm) on center.
- B. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches (400 mm) on center vertically and 24 inches (600 mm) on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches (200 mm) on center.
- C. Seismic Reinforcement: Connect veneer anchors with continuous horizontal wire reinforcement before embedding anchors in mortar.

### **3.10 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 (13 mm) of dimensioned position.

### **3.11 MASONRY FLASHINGS**

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
  - 1. Extend flashings full width at such interruptions and at least 6 inches (152 mm), minimum, into adjacent masonry or turn up flashing ends at least 1 inch (25.4 mm), minimum, to form watertight pan at non-masonry construction.
  - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
  - 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Terminate flashing up 8 inches (203 mm) minimum on vertical surface of backing:
  - 1. Install vertical leg of flashing behind water-resistive barrier sheet over backing.
  - 2. Install vertical leg of flashing over fluid-applied or self-adhered air/vapor barriers over backing or per manufacturer's directions.
  - 3. Terminate vertical leg of flashing into bed joint in masonry or reglet in concrete.
  - 4. Anchor vertical leg of flashing into backing with a termination bar and sealant.
  - 5. Apply cap bead of sealant on top edge of self-adhered flashing.
- C. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.
- D. Extend metal flashings to within 1/2 inch (12 mm) of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge, unless otherwise indicated.
- E. Support flexible flashings across gaps and openings.
- F. Extend plastic, laminated, EPDM, and membrane flashings to within 1/2 inch (12 mm) of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge, unless otherwise indicated.
- G. Lap end joints of flashings at least 6 inches (152 mm), minimum, and seal watertight with flashing sealant/adhesive.

### **3.12 LINTELS**

- A. Install loose steel lintels over openings.

### **3.13 GROUTED COMPONENTS**

- A. Lap splices minimum 24 bar diameters.



1. Unless otherwise indicated on drawings.
- B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch (13 mm) of dimensioned position.
- C. Place and consolidate grout fill without displacing reinforcing.
- D. At bearing locations, fill masonry cores with grout for a minimum 12 inches (300 mm) either side of opening.
  1. Unless otherwise indicated on drawings.

### **3.14 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.
  1. Locations:
    - a. Inside corners.
    - b. At interface with adjacent materials.
    - c. Stack bond brick patterns.
    - d. Where staggered installation is not indicated or required.
    - e. As indicated on drawings.
- C. Size brick control joints to match 3/8 inch mortar joints. Follow brick pattern and do not cut brick. Refer to locations indicated on drawings. Seal joints with sealant and backer rod in accordance with manufacture's instructions.
- D. Size control joints as indicated on drawings; if not indicated, 3/4 inch (19 mm) wide and deep.

### **3.15 BUILT-IN WORK**

- A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
  1. Fill adjacent masonry cores with grout minimum 12 inches (300 mm) from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

### **3.16 TOLERANCES**

- A. Install masonry within the site tolerances found in TMS 402/602.
- B. Maximum Variation from Alignment of Columns: 1/4 inch (6 mm).
- C. Maximum Variation From Unit to Adjacent Unit: 1/16 inch (1.6 mm).
- D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft (6 mm/3 m) and 1/2 inch in 20 ft (13 mm/6 m) or more.
- E. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.
- F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft (3 mm/m) and 1/4 inch in 10 ft (6 mm/3 m); 1/2 inch in 30 ft (13 mm/9 m).
- G. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch (minus 6.4 mm, plus 9.5 mm).
- H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch (6 mm).

### **3.17 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.

### **3.18 CLEANING**

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.

### **3.19 PROTECTION**

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

**END OF SECTION 042000**

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**SECTION 047200  
CAST STONE MASONRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Architectural cast stone.
- B. Units required are:
  - 1. Exterior wall units, including medallions.

**1.02 RELATED REQUIREMENTS**

- A. Section 040511 - Masonry Mortaring and Grouting: Mortar for setting cast stone.
- B. Section 042000 - Unit Masonry: Installation of cast stone in conjunction with masonry.
- C. Section 079200 - Joint Sealants: Sealing joints indicated to be left open for sealant.

**1.03 REFERENCE STANDARDS**

- A. ACI 318 - Building Code Requirements for Structural Concrete 2019, with Errata (2021).
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- D. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2019.
- E. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement 2019, with Editorial Revision (2020).
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.
- G. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- H. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- I. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).
- K. ASTM C1364 - Standard Specification for Architectural Cast Stone 2019.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Test results of cast stone components made previously by the manufacturer.
- C. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
  - 1. Show interface with adjacent brick and other adjacent materials.
- D. Mortar Color Selection Samples.
- E. Verification Samples: Pieces of actual cast stone components not less than 6 inches (152 mm) square, illustrating range of color and texture to be anticipated in components furnished for the project.
- F. Full-Size Samples, For Review:
  - 1. Basic Shapes: One of each.
- G. Source Quality Control Test Reports.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:

1. A firm with a minimum of 10 years experience producing cast stone of types required for project.
  2. Current producer member of 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 ten years of documented experience.

#### **1.06 MOCK-UP**

- 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.

#### **1.07 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**

#### **2.01 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.

#### **2.02 ARCHITECTURAL CAST STONE**

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural sandstone, 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 (6 meters).
  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 (3 mm) or length divided by 360, whichever is greater, but not more than 1/4 inch (6 mm).
  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 318.

## **2.03 MATERIALS**

- A. Portland Cement: ASTM C150/C150M.
  - 1. 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. Admixtures: ASTM C494/C494M.
- E. Water: Potable.
- F. Reinforcing Bars: ASTM A615/A615M deformed bars, galvanized.
  - 1. Galvanized in accordance with ASTM A767/A767M, Class I.
- G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
- H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- I. Shelf Angles and Similar Structural Items: Hot-dip galvanized steel per ASTM A123/A123M, of shapes and sizes as required for conditions.
- J. Mortar: Portland cement-lime, As specified in Section 042000 - Unit Masonry .
- 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**

### **3.01 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.

### **3.02 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 cast stone units indicated; set remainder in mortar.
- 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.

### **3.03 TOLERANCES**

- A. Joints: Make all joints 3/8 inch (9.5 mm), except as otherwise detailed.
  - 1. Rake mortar joints 3/4 inch (19 mm) for pointing.
  - 2. Remove excess mortar from face of stone before pointing joints.
  - 3. Point joints with mortar in layers 3/8 inch (9.5 mm) 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 (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
  - 2. Variation from Level: Not more than 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
  - 3. Variation in Joint Width: Not more than 1/8 inch in 36 inches (3 mm in 900 mm) or 1/4 of nominal joint width, whichever is less.
  - 4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch (1.5 mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

### **3.04 REPAIR**

- A. Repair chips and other surface damage noticeable when viewed in direct daylight at 10 feet (3 m).
- 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.

### **3.05 CLEANING**

- A. Keep cast stone components clean as work progresses.
- B. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

### **3.06 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 047200**

**SECTION 047300  
MANUFACTURED STONE MASONRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Adhered manufactured stone masonry veneer (AMSMV).
- B. Installation materials.
- C. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 072500 - Weather Barriers: Water-resistive barrier over sheathing.
- B. Section 079200 - Joint Sealants: Sealing control and expansion joints.

**1.03 REFERENCE STANDARDS**

- A. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar 2019.
- B. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar 2019.
- C. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019a, with Editorial Revision.
- D. ASTM C847 - Standard Specification for Metal Lath 2018.
- E. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster 2022a.
- F. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster 2022.
- G. ASTM C1670/C1670M - Standard Specification for Adhered Manufactured Stone Masonry Veneer Units 2021b.
- H. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry 2019a.
- I. ASTM C1780 - Standard Practice for Installation Methods for Cement-Cased Adhered Masonry Veneer 2020.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- K. ICC-ES AC51 - Acceptance Criteria for Precast Stone Veneer 2016.
- L. MVMA (AMSV) - Installation Guide and Detailing Options for Compliance with ASTM C1780 for Adhered Manufactured Stone Veneer 2021.
- M. NCMA TEK 20-01 - Key Installation Checkpoints for Manufactured Stone Veneer 2014.
- N. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene one week before starting work of this section.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for AMSMV units, mortar, lath, and rainscreen drainage material, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Color charts.
  - 4. Installation methods.



- C. Shop Drawings: Submit detail drawings depicting proper installation and flashing techniques. Coordinate locations with those found on drawings. Show interface with adjacent materials. Show proposed control joint locations.
- D. Manufacturer's Qualification Statement.
- E. Installer's Qualification Statement.
- F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- G. Specimen Warranty.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified, with at least five years of documented experience and approved by manufacturer.

#### **1.07 MOCK-UP**

- A. Construct mock-up panel 8 feet (2.4 m) long by 6 feet (1.8 m) high; include AMSMV, mortar, accessories, substrate, and representative wall openings in mock-up.
- B. See Section 014000 - Quality Requirements for additional requirements.
- C. Locate where directed.
- D. Mock-up may remain as part of the work.

#### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Prevent mechanical damage and contamination by other materials.
- C. Protect products from precipitation combined with freezing temperatures. Do not install products with visible frozen moisture.
- D. Protect Portland cement based materials from moisture and humidity. Store under cover off the ground in a dry location.

#### **1.09 FIELD CONDITIONS**

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

#### **1.10 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a one year period after Date of Substantial Completion.
- C. Provide 50 year manufacturer warranty for AMSMV.
- D. Provide 15 year manufacturer warranty for mortar and other installation materials used in exterior installations over steel or wood framing.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Adhered manufactured stone masonry veneer (AMSMV):
  - 1. Basis-of-design: Coronado Stone Products: [www.coronado.com/#sle](http://www.coronado.com/#sle).
  - 2. Substitutions: See Section 016000 - Product Requirements.

#### **2.02 ADHERED MANUFACTURED STONE MASONRY VENEER (AMSMV)**

- A. AMSMV: Cast masonry units using a mixture of cement, lightweight aggregates, concrete additives and color pigments to replicate appearance of natural stone and designed to be applied with a cementitious mortar to a backing surface, complying with ASTM C1670/C1670M and ICC-ES AC51.

1. Style: Sawtooth Ledge, drystacked.
  2. Color, Texture, Range, Special Shapes: Northland.
  3. Walls: Provide with single color and texture throughout.
- B. AMSMV Trim: Provide hearth stones, wall caps, drip ledges, keystones, quoins, corner stones, and as indicated.
- C. Accessory Components: Provide electrical outlets and as indicated and required for project.

### **2.03 MORTAR APPLICATIONS**

- A. At Contractor's option, mortar may be field-mixed from packaged dry materials, made from factory premixed dry materials with addition of water only, or ready-mixed.
- B. Mortar Color: Natural gray unless otherwise indicated.
- C. Dash Bond Coat: One part Portland cement, with maximum two parts sand.
- D. Scratch Coat Mortars: Scratch coat mortars for application directly to metal lath.
1. Site-Mixed: ASTM C270, Type S, using the Proportion Method as specified in Section 040511.
  2. Prepackaged/Preblended: ASTM C1714/C1714M, Type S.
- E. Setting Bed Mortars: Setting bed used to adhere AMSMV units to scratch coat mortar or to bondable concrete or concrete masonry.
1. Site-Mixed: ASTM C270, Type S, using the Proportion Method as specified in Section 040511.
  2. Prepackaged/Preblended: ASTM C1714/C1714M, Type S.
  3. Prepackaged/Preblended Latex Modified: ANSI A118.4 or ANSI A118.15.
- F. Setting Bed Mortars: Setting bed used to adhere AMSMV units to cement board.
1. Prepackaged/Preblended Latex Modified: ANSI A118.4 or ANSI A118.15.
- G. Pointing Mortars: Pointing or grouting mortars used to fill the joints between individual AMSMV units once the setting bed mortar has sufficiently cured.
1. Site-Mixed: ASTM C270, Type S, using the Proportion Method as specified in Section 040511.
  2. Prepackaged/Preblended: ASTM C1714/C1714M, Type N or Type S.
  3. Prepackaged/Preblended Latex Modified: ANSI A118.4 or ANSI A118.15.

### **2.04 MORTAR MIXES**

- A. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
1. Type: Type S.
  2. Color: Standard gray.

### **2.05 ACCESSORIES**

- A. Metal Lath with Rainscreen Drainage Material: Factory-assembled combination of mesh drainage material and metal lath.
1. Diamond Mesh Metal Lath: ASTM C847, galvanized, self-furring.
  2. Rainscreen Drainage Mesh: 90 percent open non-woven polyester mesh.
  3. Manufacturers:
    - a. Mortar Net Solutions; LathNet: [www.mortarnet.com/#sle](http://www.mortarnet.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
- B. Rainscreen Drainage Material:
1. Rainscreen Drainage Mat: Polyester or polypropylene mesh.
    - a. 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.
    - b. Seam Tape and Bug Screen: As recommended by rainscreen drainage mat manufacturer.
    - c. Manufacturers:

- 1) Alabama Metal Industries Corporation; HydroDry Rainscreen:  
www.amicoglobal.com/#sle.
- 2) Substitutions: See Section 016000 - Product Requirements.
2. Rainscreen Drainage Accessories:
  - a. Material: PVC, open grid flanges or perforated with nailing holes.
  - b. Color: Gray.
3. Rainscreen Drainage Panels: Ribbed, dimpled, or channeled polyethylene or extruded polystyrene sheets with polypropylene fabric mortar screen on one face.
- C. Cleaning Solution: Non-acidic, not harmful to AMSMV work or adjacent materials, approved by AMSMV manufacturer.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that backup wall system construction complies with AMSMV manufacturer's instructions, MVMA (AMSV), NCMA TEK 20-01, ASTM C1780 and ICC-ES AC51.
- B. Verify that substrates to receive mortar scratch coat or setting bed comply with AMSMV manufacturer's instructions, MVMA (AMSV), NCMA TEK 20-01, ASTM C1780 and ICC-ES AC51:
  1. Metal Lath and Accessories: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.
- C. Verify that related items provided under other sections are properly sized and located.
- D. Verify that built-in items are in proper location, and ready for installation of AMSMV.

#### **3.02 PREPARATION**

- A. Dampen masonry surfaces to reduce excessive suction.

#### **3.03 INSTALLATION - RAINSCREEN DRAINAGE MATERIAL**

- A. Install rainscreen drainage material and metal lath with accessories over sheathing material and water-resistive barrier with fastening system in accordance with ASTM C1063 into wood or metal studs. Install drainage material with filter fabric mortar screen to exterior.
- B. Install metal lath with rainscreen drainage material in accordance with the manufacturer's instructions.

#### **3.04 INSTALLATION - SCRATCH COAT**

- A. Apply mortar scratch coat of 1/2 inch (12.5 mm) nominal to cover metal lath in accordance with ASTM C926. Scratch surface when somewhat firm. If scratch coat dries before applying setting bed mortar and AMSMV, moisten scratch coat by misting it with water.

#### **3.05 INSTALLATION - AMSMV**

- A. Install AMSMV with a cementitious mortar setting bed to a scratch coat backing surface, in accordance with AMSMV manufacturer's instructions, MVMA (AMSV), NCMA TEK 20-01, ASTM C1780 and ICC-ES AC51.
- B. Mortar Joints: Drystacked.
  1. Style: Tight fit joints.
- C. Windows, Doors and Wall Openings: Install specified trim stones where located on drawings.
- D. Sills: Install sills where located on drawings.
- E. Caps: Install capstones where located on drawings.
- F. Seal all joints at wall openings and penetrations with sealant approved for use with AMSMV.

#### **3.06 INSTALLATION - 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.

- B. Extend metal flashings through exterior face of AMSMV and terminate in an angled drip with hemmed edge.
- C. Lap end joints of flashings at least 6 inches (152 mm), minimum, and seal watertight with flashing sealant/adhesive.

### **3.07 CONTROL AND EXPANSION JOINTS**

- A. Form joints as detailed on drawings, minimum spacing per manufacturer's specifications.

### **3.08 TOLERANCES**

- A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch (1.6 mm).
- B. Maximum Variation from Plane of Wall: 1/4 inch in 10 feet (6 mm in 3 m) and 1/2 inch in 20 feet (13 mm in 6 m) or more.
- C. Maximum Variation from Plumb: 1/4 inch (6 mm) per story non-cumulative; 1/2 inch (13 mm) in two stories or more.
- D. Maximum Variation from Level Coursing: 1/8 inch in 3 feet (3 mm in 1 m) and 1/4 inch in 10 feet (6 mm in 3 m); 1/2 inch in 30 feet (13 mm in 9 m).
- E. Maximum Variation of Joint Thickness: 1/8 inch in 3 feet (3 mm in 1 m).

### **3.09 CUTTING AND FITTING**

- A. Cut and fit for pipes, conduit, and as indicated. Coordinate with other sections of work to provide correct size, shape, and location.

### **3.10 CLEANING**

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean AMSMV in accordance with manufacturer's installation instructions.
- D. Clean soiled surfaces with cleaning solution.

### **3.11 PROTECTION**

- A. Protect finished work from rain during and for 48 hours following installation.
- B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

**END OF SECTION 047300**

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## **SECTION 051200 - STRUCTURAL STEEL FRAMING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Structural steel.
  - 2. Grout.
- B. Related Sections include the following:
  - 1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
  - 2. Division 05 Section "Steel Decking" for field installation of shear connectors.
  - 3. Division 05 Section "Metal Fabrications" for steel lintels or shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel.
  - 4. Division 09 painting Sections for surface preparation and priming requirements.

#### **1.3 DEFINITIONS**

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges," that support design loads.

#### **1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Include embedment drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
  - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
  - 5. Do not begin fabrication of materials prior to review of shop drawings.
  - 6. Review of shop drawings is for member sizes, spacing, details, and general compliance with Contract Drawings only.
  - 7. Material quantities, lengths, fit, verification of job conditions and coordination with other trades are responsibility of Contractor.
  - 8. Reproductions of Contract Drawings shall not be used for shop drawings

- C. Welding certificates.
- D. Qualification Data: For Installer, fabricator and testing agency.
- E. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
  - 1. Structural steel including chemical and physical properties.
  - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 3. Direct-tension indicators.
  - 4. Tension-control, high-strength bolt-nut-washer assemblies.
  - 5. Shear stud connectors.
  - 6. Shop primers.
- F. Source quality-control test reports.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Not less than 5 years of experience in erection of structural steel for projects of similar size and complexity.
- B. Fabricator Qualifications: Not less than 5 years of experience in erection of structural steel for projects of similar size and complexity.
- C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- D. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code-Steel."
  - 1. Welders are to be employed on work shall maintain current AWS certification throughout duration of project.
  - 2. If requested by Architect, submit identifying stenciled test coupons made by operator whose workmanship is subject to question, and if reasonable doubt of proficiency exists, welder shall be re-qualified and certified by independent testing laboratory at no additional expense to Owner.
  - 3. Work suspected of deficient quality may be subject to removal of coupons from any location on any joint for testing. Remove section of welds found defective and properly re-weld before proceeding with work.
- E. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  - 2. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
  - 3. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
  - 4. AISC's "Load and Resistance Factor Design Specification for Structural Steel Buildings".
  - 5. AISC's "Specification for the Design of Steel Hollow Structural Sections."
  - 6. AISC's "Specification for Allowable Stress Design of Single-Angle Members".
  - 7. AISC's "Specification for Load and Resistance Factor Design of Single-Angle Members".
  - 8. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- F. Pre-Installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from erosion and deterioration.
  - 1. Store fasteners in a protected place. Clean and relubricate bolts and nuts that become dry or rusty before use.
  - 2. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

## 1.7 COORDINATION

- A. Furnish anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

## PART 2 - PRODUCTS

### 2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M (Grade 50).
- B. Channels and Angles: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

### 2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: Unless noted otherwise on Contract Documents, ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers. Plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers, plain.
- C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- D. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
  - 1. Configuration: Straight or Hooked as indicated on the contract documents.
  - 2. Nuts: ASTM A 563 heavy hex carbon steel.



3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436 hardened carbon steel.
5. Finish: Plain unless noted otherwise on the Contract Documents.

E. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 hardened carbon steel.
4. Finish: Plain unless noted otherwise on the Contract Documents.

F. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Washers: ASTM F 436 hardened carbon steel.
3. Finish: Plain unless noted otherwise on the Contract Documents.

G. Slide Bearings: Constructed of filled 'Teflon' bonded to flat rigid back-up plates.

1. Representative product and suppliers:
  - a. Con-Slide Bearings, Type CSA as manufactured by Con-Serv, Inc., 685 Aviation Blvd., Georgetown, SC 29440, (803) 546-1044.
  - b. Fluorogold Slide Bearings as manufactured by: Seismic Energy Products, L.P., 518 Progress Way, Athens, TX 75751, (903) 675-8571

H. Eye Bolts and Nuts: ASTM A 108, Grade 1030, cold-finished carbon steel.

I. Sleeve Nuts: ASTM A 108, Grade 1018, cold-finished carbon steel.

## 2.3 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.
- B. Galvanizing Repair Paint: ASTM A 780.

## 2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" or "Load and Resistance Factor Design Specification for Structural Steel Buildings"

1. Camber structural-steel members where indicated.

2. Identify high-strength structural steel according to ASTM A 6/ A 6M and maintain markings until structural steel has been erected.
  3. Mark and match-mark materials for field assembly.
  4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Architecturally Exposed Structural Steel: Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel identified as architecturally exposed structural steel.
1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, seam marks, roller marks, rolled trade names, and roughness.
  2. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
- C. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- D. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- E. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
- G. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## 2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
1. Joint Type: Snug tightened unless noted otherwise on Contract Documents.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
1. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
  2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
  3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.

- a. Grind butt welds flush.
- b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

## 2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  - 2. Surfaces to be field welded.
  - 3. Surfaces to be high-strength bolted with slip-critical connections.
  - 4. Surfaces to receive sprayed fire-resistive materials.
  - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  - 1. SSPC-SP 2, "Hand Tool Cleaning."
  - 2. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC 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.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  - 2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.
- D. Painting: Apply a 1-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

## 2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/ A 123M.
  - 1. Fill vent holes and grind smooth after galvanizing.
  - 2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

## 2.9 SOURCE QUALITY CONTROL

- A. Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - 3. Ultrasonic Inspection: ASTM E 164.
  - 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:
  - 1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of erection implies acceptance of existing conditions.

#### **3.2 PREPARATION**

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.
  - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

#### **3.3 ERECTION**

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" or "Load and Resistance Factor Design Specification for Structural Steel Buildings."

- B. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
  - 1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Weld plate washers to top of base plate.
  - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
  - 4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Remove erection bolts on welded, architecturally exposed structural steel; fill holes with plug welds; and grind smooth at exposed surfaces.
- G. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1.
- H. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

### 3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
  - 1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" or "Load and Resistance Factor Design Specification for Structural Steel Buildings" for

- bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
- 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
- 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
- 4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
  - a. Grind butt welds flush.
  - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
  - 1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
  - 1. Perform bend tests if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

### 3.6 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
  2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

**END OF SECTION 051200**

## **SECTION 05 3100**

### **STEEL DECKING**

#### **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. This Section includes the following:
  - 1. Roof deck.
- B. Related Sections include the following:
  - 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
  - 2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
  - 3. Division 09 painting Sections for repair painting of primed deck.

##### **1.3 SUBMITTALS**

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product Certificates: For each type of steel deck, signed by product manufacturer.
- D. Welding certificates.
- E. Field quality-control test and inspection reports.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
  - 1. Power-actuated mechanical fasteners.
- G. Research/Evaluation Reports: For steel deck.

##### **1.4 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
  - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."



- E. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL's "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.
- F. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
- C. Do not overload deck during construction by workmen or storage of materials.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Steel Deck:
    - a. Consolidated Systems, Inc.
    - b. Epic Metals Corporation.
    - c. Marlyn Steel Decks, Inc.
    - d. New Millennium Building Systems, LLC.
    - e. Nucor Corp.; Vulcraft Division.
    - f. Roof Deck, Inc.
    - g. United Steel Deck, Inc.
    - h. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

#### 2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
  - 1. Galvanized-Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 50, G60 zinc coating.
  - 2. Deck Profile: As indicated on Contract Documents.
  - 3. Profile Depth: As indicated on Contract Documents.
  - 4. Design Uncoated-Steel Thickness: As indicated on Contract Documents.
  - 5. Span Condition: Triple span or more.
  - 6. Side Laps: Overlapped.

#### 2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

- D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- E. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 30 for overhang and slab depth or as indicated on the Contract Documents.
- F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- G. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 thick, with factory-punched hole of 3/8-inch minimum diameter.
- I. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch wide flanges and recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- J. Flat Sump Plate: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- K. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- L. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

#### **3.2 INSTALLATION, GENERAL**

- A. Do not proceed with installation until all unsatisfactory existing conditions are corrected. Commencement of installation implies acceptance of existing conditions.
- B. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- C. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- D. Locate deck bundles to prevent overloading of supporting members.
- E. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- F. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- G. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- H. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- I. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

- J. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

### 3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
  - 1. Weld Diameter: 5/8 inch nominal.
  - 2. Weld Spacing: Space welds as indicated on the Contract Documents.
  - 3. Weld Washers: As indicated on the Contract Documents.
- B. Side-Lap and Perimeter Edge Fastening: as indicated on the Contract Documents
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches , with end joints as follows:
  - 1. End Joints: Lapped 2 inches minimum.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.
  - 1. Install reinforcing channels or zees in ribs to span between supports and weld.
- E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.
- F. Install 6-inch minimum wide sheet steel cover plates of same thickness as deck where deck changes direction. Mechanically attach at 6 inches on center maximum.
- G. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's recommendations. Weld to substrate to provide a complete deck installation.
- H. Do not attach hangers for ceiling grids, ductwork, and mechanical piping directly to metal roof deck.
- I. Place metal cant strips in position and mechanically attach.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

### 3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
  - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
  - 2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Division 09 Painting.
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

**END OF SECTION**

## **SECTION 054000 - COLD-FORMED METAL FRAMING**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Exterior non-load-bearing wall framing.
- B. Related Sections include the following:
  - 1. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B. Connection: Submit manufacturer's data for each type of manufactured connection, screw, or fastener verifying conformance with Contract Drawings.
- C. Welding certificates.
- D. Qualification Data: For testing agency.
- E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
  - 1. Steel sheet.
  - 2. Expansion anchors.
  - 3. Power-actuated anchors.
  - 4. Mechanical fasteners.
  - 5. Vertical deflection clips.
  - 6. Horizontal drift deflection clips
  - 7. Miscellaneous structural clips and accessories.
- F. Research/Evaluation Reports: For cold-formed metal framing.

#### **1.4 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

- B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements and metallic-coating thickness.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- D. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- E. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
  - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
  - 1. California Expanded Metal Products Company.
  - 2. Clark Steel Framing.
  - 3. Consolidated Fabricators Corp.; Building Products Division.
  - 4. Dietrich Metal Framing; a Worthington Industries Company.
  - 5. MarinoWare; a division of Ware Industries.
  - 6. Quail Run Building Materials, Inc.
  - 7. SCAFCO Corporation.
  - 8. United Metal Products, Inc.
  - 9. Studs Unlimited

### 2.2 MATERIALS

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: ASTM A653. Minimum yield strength of 33 ksi (33,000 psi) with the exception that 16 gauge and heavier studs and joists shall have a minimum yield strength of 50 ksi.
  - 2. Coating: G60

- B. Steel Sheet for Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
  - 1. Grade: 50, Class 1 or 2.
  - 2. Coating: G90

## 2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: As indicated on the Contract Documents.
  - 2. Section Properties As indicated on the Contract Documents.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with un-stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: As indicated on the Contract Documents. Flange Width: 1-1/4.
- C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips as indicated on the Contract Documents, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dietrich Metal Framing; a Worthington Industries Company.
    - b. MarinoWare, a division of Ware Industries.
    - c. SCAFCO Corporation
    - d. The Steel Network, Inc.
- D. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

## 2.4 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
  - 1. Supplementary framing.
  - 2. Bracing, bridging, and solid blocking.
  - 3. Web stiffeners.
  - 4. Anchor clips.
  - 5. End clips.
  - 6. Foundation clips.
  - 7. Gusset plates.
  - 8. Stud kickers, knee braces, and girts.
  - 9. Joist hangers and end closures.

10. Hole reinforcing plates.
11. Backer plates.

## 2.5 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
  1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

## 2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
- B. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, non-staining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
- C. Shims: Load bearing, high-density multi-monomer plastic, non-leaching.
- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

## 2.7 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  1. Fabricate framing assemblies using jigs or templates.
  2. Cut framing members by sawing or shearing; do not torch cut.



3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
  4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of installation implies acceptance of existing conditions.

#### **3.2 PREPARATION**

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

### 3.3 INSTALLATION, GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to Contract Documents, AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
  - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
  - 1. Cut framing members by sawing or shearing; do not torch cut.
  - 2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Securely anchor track to floor and overhead structure or members. Abutting pieces of track shall be securely anchored to a common structural element, or they shall be butt welded or otherwise spliced together.
- G. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- H. Attachments of exterior metal framing components shall be as indicated or if not indicated, as recommended by the manufacturer for the design loads and applications indicated. Dissimilar structural components shall be attached by welding, screw attachment, or bolting. Wire tying of framing components in structural applications shall not be permitted.
- I. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- J. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- K. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

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

### 3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as indicated on the Contract Documents.
- C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  - 1. Connect vertical deflection clips to bypassing or infill studs and anchor to building structure.
  - 2. Connect drift clips to cold formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
  - 1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

### 3.5 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

**END OF SECTION 054000**

## **SECTION 05500 - METAL FABRICATIONS**

### **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. Steel framing and supports for mechanical and electrical equipment.
  - 2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
  - 3. Shelf angles.
  - 4. Loose bearing and leveling plates.
  - 5. Metal ladders.
  - 6. Metal bollards.
- B. Products furnished, but not installed, under this Section include the following:
  - 1. Loose steel lintels.
- C. Related Sections include the following:
  - 1. Division 4 Section "Unit Masonry Assemblies" for installing loose lintels, anchor bolts, and other items indicated to be built into unit masonry.
  - 2. Division 5 Section "Structural Steel."
  - 3. Division 5 Section "Pipe and Tube Railings."
  - 4. Division 6 Section "Miscellaneous Carpentry" for metal framing anchors.

#### **1.3 SUBMITTALS**

- A. Product Data: For the following:
  - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
  - 2. Paint products.
  - 3. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
  - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
  - 2. Provide templates for anchors and bolts specified for installation under other Sections.

#### **1.4 QUALITY ASSURANCE**

- A. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."

## 1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
  1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
  2. Provide allowance for trimming and fitting at site.

## 1.6 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. 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.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

## 2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

## 2.3 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- C. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- D. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.

1. Size of Channels: As indicated.
2. Material: Steel complying with ASTM A 1008/A 1008M, commercial steel, Type B structural steel, Grade 33 0.0966-inch minimum thickness; hot-dip galvanized after fabrication.

## 2.4 NONFERROUS METALS

- A. Bronze Plate, Sheet, Strip, and Bars: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).
- B. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500.

## 2.5 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563 ; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1
- D. Anchor Bolts: ASTM F 1554, Grade 36.
  1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Lag Bolts: ASME B18.2.1.
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1.
- J. Lock Washers: Helical, spring type, ASME B18.21.1.
- K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
  1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the

load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.

## 2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Division 9 painting Sections.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint for reglazing welds in steel, complying with SSPC-Paint 20.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

## 2.7 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. 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.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
  1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.



4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
  1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

## 2.8 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  1. Fabricate units from slotted channel framing where indicated.
  2. Furnish inserts if units are installed after concrete is placed.
- C. Galvanize miscellaneous framing and supports where indicated.

## 2.9 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.
- C. Galvanize loose steel lintels located in exterior walls.

## 2.10 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.
  - 1. Provide mitered and welded units at corners.
  - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

#### 2.11 LOOSE BEARING AND LEVELING PLATES

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

#### 2.12 METAL LADDERS

- A. General:
  - 1. Comply with ANSI A14.3, unless otherwise indicated.
  - 2. Space side rails 18 inches apart, unless otherwise indicated.
  - 3. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted brackets, made from same metal as ladder.
- B. Steel Ladders:
  - 1. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
  - 2. Rungs: 1-inch-diameter steel bars.
  - 3. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
  - 4. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung by a proprietary process.
  - 5. Products:
    - a. IKG Industries, a Harsco company; Mebac.
    - b. W. S. Molnar Company; SlipNOT.
  - 6. Galvanize exterior ladders and interior ladders, where indicated, including brackets and fasteners.

#### 2.13 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 80 steel pipe.
  - 1. Cap bollards with 1/4-inch-thick steel plate.

2. Where bollards are indicated to receive push-button controls for door operators, provide necessary cutouts for push-button controls and hole for wire.

#### 2.14 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

#### 2.15 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
  1. ASTM A 123/A 123M, for galvanizing steel and iron products.
  2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
  1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
  1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

#### 2.16 COPPER-ALLOY FINISHES

- A. Finish designations for copper alloys comply with the system established for designating copper-alloy finish systems defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."
- B. Extruded-Nickel Silver Finish: M11 (Mechanical Finish: specular, as fabricated).
- C. Bronze Plate, Sheet, Strip, and Bar Finish: M10 (Mechanical Finish: unspecified, as fabricated).

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges

and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

### 3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

### 3.3 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
  - 1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
  - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### 3.4 INSTALLING METAL BOLLARDS

- A. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- B. Fill bollards solidly with concrete, mounding top surface to shed water.

### 3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

**END OF SECTION 05500**

**SECTION 055000  
METAL FABRICATIONS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Shop fabricated steel and aluminum items.
  - 1. Miscellaneous steel or aluminum framing, supports, reinforcement, loose bearing and leveling plates, shelf angles and other steel or aluminum members or fabrications for applications as required for project and where they are not specified in other Sections.

**1.02 RELATED REQUIREMENTS**

- A. Section 055100 - Metal Stairs.
- B. Section 055213 - Pipe and Tube Railings.
- C. Section 099123 - Interior Painting: Paint finish.

**1.03 REFERENCE STANDARDS**

- A. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2017.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- D. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing 2021.
- E. 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.
- F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- G. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes 2019a.
- H. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire 2019.
- I. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings 2018, with Editorial Revision.
- J. ASTM B85/B85M - Standard Specification for Aluminum-Alloy Die Castings 2018, with Editorial Revision.
- K. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- L. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- M. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- N. 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.
- O. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.
- P. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- Q. AWS D1.2/D1.2M - Structural Welding Code - Aluminum 2014, with Errata (2020).
- R. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172 2019.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
  - 1. Design data: Submit drawings and supporting calculations, signed and sealed by a qualified professional structural engineer.
    - a. Include the following, as applicable:
      - 1) Design criteria.
      - 2) Engineering analysis depicting stresses and deflections.
      - 3) Member sizes and gauges.
      - 4) Details of connections.
      - 5) Support reactions.
      - 6) Bracing requirements.
- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- D. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

## **1.05 QUALITY ASSURANCE**

- A. Design metal fabrications under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.
- C. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS - STEEL**

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- E. Stainless Steel, General: ASTM A666, Type 304.
- F. Stainless Steel Tubing: ASTM A554, Type 304, 16 gauge, 0.0625 inch (1.59 mm) minimum metal thickness, 1-1/2 inch (38 mm) diameter.
- G. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.
- H. Slotted Channel Fittings: ASTM A1011/A1011M.
- I. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.
- J. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- K. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- L. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- M. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- N. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

### **2.02 MATERIALS - ALUMINUM**

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

- B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.
- C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.
- D. Aluminum-Alloy Bars: ASTM B211/B211M, 6061 alloy, T6 temper.
- E. Aluminum-Alloy Sand Castings: ASTM B26/B26M.
- F. Aluminum-Alloy Die Castings: ASTM B85/B85M.
- G. Bolts, Nuts, and Washers: Stainless steel.
- H. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

### **2.03 FABRICATION**

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

### **2.04 FABRICATED ITEMS**

- A. As required for project.

### **2.05 FINISHES - STEEL**

- A. Prime Painting: One coat.

### **2.06 FINISHES - ALUMINUM**

- A. Interior Aluminum Surfaces: Match existing.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

### **3.02 INSTALLATION**

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.

**END OF SECTION 055000**



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## **SECTION 055100 METAL STAIRS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Stairs with concrete treads.
- B. Stairs with grating treads.
- C. Structural steel stair framing and supports.
- D. Handrails and guards.
- E. Stair types are indicated in Section 3.05, Schedule. Additional information is indicated on drawings.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Concrete fill in stair pans.
- B. Section 033000 - Cast-in-Place Concrete: Placement of metal anchors in concrete.
- C. Section 042000 - Unit Masonry: Placement of metal fabrications in masonry.
- D. Section 055000 - Metal Fabrications.
- E. Section 057000 – Decorative Metal: Decorative Steel Mesh Guardrails at Metal Stairs and other guardrail locations.
- F. Section 099113 - Exterior Painting: Paint finish.
- G. Section 099123 - Interior Painting: Paint finish.

#### **1.03 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures 2006.
- C. ASTM A6/A6M - Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling 2021.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- E. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- F. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- G. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- H. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications 2022a.
- I. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.
- J. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- K. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.
- L. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2021.
- M. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

- N. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates 2015 (Reapproved 2021).
- O. 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.
- P. 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.
- Q. 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.
- R. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.
- S. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- T. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172 2019.
- U. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- V. NAAMM AMP 510 - Metal Stairs Manual 1992.
- W. NAAMM MBG 531 - Metal Bar Grating Manual 2017.
- X. NAAMM MBG 532 - Heavy Duty Metal Bar Grating Manual 2019.
- Y. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- Z. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.
- AA. SSPC-SP 2 - Hand Tool Cleaning 2018.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for each type of stair and accessory and component.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, 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.
  - 3. Show interface with adjacent work.
  - 4. Indicate compliance with specified quality level.
  - 5. Use same stair names as indicated on drawings.
- D. Design Data: As required by authorities having jurisdiction.
- E. Samples: Steel mesh.
- F. Welders' Certificates.
- G. Designer's Qualification Statement.
- H. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.
- I. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.
- J. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats

#### **1.05 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. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- C. Fabricator Qualifications:
  - 1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
  - 2. A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
  - 3. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.
- D. Coordination: Coordinate shop primers with topcoats:
  - 1. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

## **PART 2 PRODUCTS**

### **2.01 METAL STAIRS - GENERAL**

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
  - 1. Regulatory Requirements: Provide stairs and railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
  - 2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
  - 3. Structural Design: Provide complete stair and railing assemblies that comply with the applicable local code.
    - a. Stair Capacity: Uniform live load of 100 lb/sq ft (4.7 kPa) and a concentrated load of 300 lb (and a concentrated load of 14.4 kg) with deflection of stringer or landing framing not to exceed 1/360 of span.
    - b. Refer to additional information indicated on structural drawings.
      - 1) Refer to drawings for additional lateral design loads to the stair landings. Stair structure is braced at floor diaphragms and shall be designed to resist lateral loads.
    - c. Railing Assemblies: Comply with applicable local code or the following, which ever is more stringent:
      - 1) Uniform load of 50 lbf/ft. applied in any direction.
      - 2) Concentrated load of 200 lbf applied in any direction.
      - 3) Uniform and concentrated loads need not be assumed to act concurrently.
      - 4) Infill:
        - (a) Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
        - (b) Infill load and other loads need not be assumed to act concurrently.
  - 4. Dimensions: As indicated on drawings.
  - 5. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
  - 6. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
  - 7. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
  - 1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
    - a. Welded Joints: Continuously welded and ground smooth and flush.
      - 1) Spot welds are not allowed.
    - b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
    - c. Exposed Edges and Corners: Eased to small uniform radius.

- d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
- 2. Commercial: Exposed joints as inconspicuous as possible, whether welded or mechanical; underside of stair not covered by soffit IS considered exposed to view.
  - a. Welded Joints: Intermittently welded on back side, filled with body putty, and sanded smooth and flush.
  - b. Welds Exposed to View: Ground smooth and flush.
  - c. Mechanical Joints: Butted tight, flush, and hairline.
  - d. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts.
  - e. Exposed Edges and Corners: Eased to small uniform radius.
  - f. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for satin or matte finish.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surface.

## **2.02 METAL STAIRS WITH CONCRETE TREADS**

- A. Jointing and Finish Quality Level: Architectural, as defined above.
- B. Risers: Closed.
- C. Treads: Metal pan with field-installed concrete fill.
  - 1. Concrete Depth: 1-1/2 inches (38 mm), minimum.
  - 2. Tread Pan Material: Steel sheet.
  - 3. Tread Pan Thickness: As required by design; 14 gauge, 0.075 inch (1.9 mm) minimum.
  - 4. Concrete Reinforcement: Welded wire mesh.
  - 5. Concrete Finish:
    - a. As indicated on drawings.
- D. Risers: Same material and thickness as tread pans.
  - 1. Nosing Depth: Not more than 1-1/2 inch (38 mm) overhang.
  - 2. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch (12 mm) wide.
- E. Stringers: Rolled steel channels.
  - 1. Stringer Depth: 12 inches (305 mm).
  - 2. Unless otherwise required for application.
  - 3. End Closure: Sheet steel of same thickness as risers welded across ends.
- F. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.
- G. Railings: Steel mesh and steel picket as indicated.
- H. Finish: Shop- or factory-prime painted.
- I. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view surfaces.

## **2.03 METAL STAIRS WITH GRATING TREADS**

- A. Jointing and Finish Quality Level: Commercial, as defined above.
- B. Risers: Closed.
- C. Treads: Steel or Aluminum bar grating.
  - 1. Grating Type: Welded.
  - 2. Bearing Bar Depth: 1 inch (25 mm), minimum.

3. Top Surface: Serrated.
  4. Nosing: Abrasive cast aluminum.
  5. Nosing Width: 1-1/4 inch (32 mm), minimum.
  6. Anchorage to Stringers: End plates welded to grating, bolted to stringers.
- D. Stringers: Rolled steel channels or steel plates.
1. Stringer Depth: 12 inches (305 mm).
- E. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.
- F. Railings: Steel mesh railings.
- G. Finish: Galvanized after fabrication.

#### **2.04 HANDRAILS AND GUARDS**

- A. Wall-Mounted Rails: Tube rails.
1. Round pipe is not allowed.
  2. Size: 1-1/2 inch by 1-1/2 inch.
  3. Wall-Mounted Handrail Bracket:
    - a. Stamped steel, extruded style, flat saddle. 1/4 inch thickness. Basis-of-design: Wagner 1978F.
    - b. Paint-grade or mill finish suitable for field or shop painting.
    - c. Wall attachment: Mechanically fastened.
    - d. Handrail attachment: Mechanically fastened or welded at Contractor's option.
- B. Guards: As specified in Section 057000 – Decorative Metal.
- C. Guards:
1. Top Rails: 1-1/2 inch by 1-1/2 inch square tube.
  2. Infill at Picket Railings: Vertical or horizontal pickets.
    - a. Horizontal Spacing: Maximum 4 inches (100 mm) on center.
    - b. Material: Solid steel bar.
    - c. Shape: Square.
    - d. Size: 1/2 inch (13 mm) square.
      - 1) Unless otherwise required for application.
    - e. Top Mounting: Welded to underside of top rail.
    - f. Bottom Mounting: Welded to top surface of stringer.
  3. Infill at Mesh Railings: Woven wire mesh panels.
    - a. Basis of Design Profile: McNichols Wire Mesh Item #3621200048.
      - 1) [www.mcnichols.com](http://www.mcnichols.com).
    - b. Material and Finish: Same as stair.
    - c. Wire Size: 0.120 inch (3 mm).
    - d. Wire Spacing: 2x1 inch (50x25 mm).
    - e. Mounting: Mesh welded to steel bar frame, frame welded to posts.
  4. End and Intermediate Posts: Same material and size as top rails.
    - a. Horizontal Spacing: As indicated on drawings.
    - b. Mounting: Welded to top surface of stringer.

#### **2.05 MATERIALS**

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.
- C. Steel Plates: ASTM A6/A6M or ASTM A283/A283M.
- D. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
  2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).

- E. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230 with G90/Z275 coating.
- F. Gratings: Bar gratings that comply with NAAMM MBG 531 or NAAMM MBG 532, whichever applies based on bar sizes.
- G. Concrete Fill: See Section 033000.
- H. Concrete Reinforcement: Mesh type, galvanized.
  - 1. Unless more stringent conditions are required for application.

## **2.06 ACCESSORIES**

- A. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
- B. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- C. Shop and Touch-Up Primer: SSPC-Paint 15, and comply with VOC limitations of authorities having jurisdiction.
- D. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic, and comply with VOC limitations of authorities having jurisdiction.

## **2.07 SHOP FINISHING**

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.
- C. Prime Painting: Use specified shop- and touch-up primer.
  - 1. Preparation of Steel: In accordance with requirements of topcoat.
  - 2. Number of Coats: Two.
- D. Galvanizing: Hot-dip galvanize to minimum requirements of ASTM A123/A123M.
  - 1. Touch up abraded areas after fabrication using specified touch-up primer for galvanized surfaces.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

### **3.02 PREPARATION**

- A. When field welding is required, clean and strip primed steel items to bare metal.
- B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

### **3.03 INSTALLATION**

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, struts, and accessories required for connecting stairs to structure.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Provide welded field joints where specifically indicated on shop drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
  - 1. Provide continuous welds where exposed to view. Grind all welds flush and smooth. Spot welding is not allowed.
- E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- F. Obtain approval prior to site cutting or creating adjustments not scheduled.
- G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

### **3.04 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).

### **3.05 SCHEDULES**

- A. Press Box North and South Stairs: Concrete-filled metal pan treads and landings, steel picket guardrails, square tube handrails, with primed finish, commercial quality.
- B. Press Box Extension to Bleachers: Metal grating stairs and landings, steel mesh guardrail and square tube handrails, with galvanized finish, commercial quality.
- C. Field House East, West and South Stairs: Concrete-filled metal pan treads and landings, square tube handrails, with primed finish, architectural quality. Decorative steel mesh guardrails, see Section 057000 – Decorative Metal.
- D. Field House Mezzanine Stairs (Upper-Level Seating): Concrete-filled metal pan treads and landings, square tube handrails, with primed finish, architectural quality. Decorative steel mesh guardrails see Section 057000 – Decorative Metal.
- E. Field House Monumental Stairs: Steel stair structure, square tube handrails, with primed finish, architectural quality. Decorative steel mesh guardrails and metal risers, see Section 057000 – Decorative Metal. Wood treads and landings, see Section 062000 – Finish Carpentry. MCM cladding, see Section 074213.23 - Metal Composite Material Wall Panels.

**END OF SECTION 055100**



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## **SECTION 055133 METAL LADDERS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Shop-fabricated metal ladders.
- B. Prefabricated ladders.
  - 1. Ladder locations are indicated on drawings. Contractor may provide Shop-fabricated or Prefabricated metal ladders at Contractor's option, subject to compliance with color requirements indicated on drawings.
- C. Ladder safety systems.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 055100 - Metal Stairs.
- B. Section 099113 - Exterior Painting: Paint finish.
- C. Section 099123 - Interior Painting: Paint finish.

#### **1.03 REFERENCE STANDARDS**

- A. 29 CFR 1910.23 - Ladders Current Edition.
- B. 29 CFR 1910.28 - Duty to have Fall Protection and Falling Object Protection Current Edition.
- C. 29 CFR 1910.29 - Fall Protection Systems and Falling Object Protection - Criteria and Practices Current Edition.
- D. 29 CFR 1926.1053 - Ladders Current Edition.
- E. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.
- F. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- G. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- H. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements 2008 (Reaffirmed 2018).
- I. ANSI/ASSP Z359.15 - Safety Requirements for Single Anchor Lifelines and Fall Arresters for Personal Fall Arrest Systems 2014.
- J. ANSI/ASSP Z359.16 - Safety Requirements for Climbing Ladder Fall Arrest Systems 2016.
- K. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- L. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- M. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- N. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.
- O. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- P. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2021.
- Q. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings 2018, with Editorial Revision.

- R. ASTM B85/B85M - Standard Specification for Aluminum-Alloy Die Castings 2018, with Editorial Revision.
- S. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- T. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- U. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes 2019a.
- V. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire 2019.
- W. ASTM B85/B85M - Standard Specification for Aluminum-Alloy Die Castings 2018, with Editorial Revision.
- X. 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.
- Y. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.
- Z. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- AA. AWS D1.2/D1.2M - Structural Welding Code - Aluminum 2014, with Errata (2020).
- BB. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172 2019.
- CC. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- DD. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.
- EE. SSPC-SP 2 - Hand Tool Cleaning 2018.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.
- C. Shop Drawings:
  - 1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
  - 2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- D. Certificate: Provide documentation that ladder safety system products of this section meet or exceed cited 29 CFR 1910.28, 29 CFR 1910.29, ANSI/ASSP Z359.16, and ANSI A14.3 requirements.
- E. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.
- F. Designer's Qualification Statement.
- G. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

#### **1.05 QUALITY ASSURANCE**

- A. Design under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS - STEEL**

TPS Memorial Highschool - New  
 Facade and Secure Entry  
 20210120.01

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Metal Ladders  
 10/20/2022

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.
- E. Mechanical Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- F. Bolts, Nuts, and Washers: ASTM A307, plain.
- G. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
- H. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- I. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- J. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

## **2.02 MATERIALS - ALUMINUM**

- A. Extruded Aluminum: ASTM B211/B211M, 6063 alloy, T6 temper.
- B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.
- C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.
- D. Aluminum-Alloy Bars: ASTM B211/B211M, 6061 alloy, T6 temper.
- E. Aluminum-Alloy Sand Castings: ASTM B26/B26M.
- F. Aluminum-Alloy Die Castings: ASTM B85/B85M .
- G. Bolts, Nuts, and Washers: Stainless steel.
- H. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

## **2.03 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. Continuously seal joined members by continuous welds.
- D. 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. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

## **2.04 FABRICATED LADDERS**

- A. Ladders: Steel or Aluminum; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint or prefinished finish.
  - 1. Side Rails: 3/8 by 2 inches (9 by 50 mm) members spaced at 20 inches (500 mm).
  - 2. Rungs: One inch (25 mm) diameter solid round bar spaced 12 inches (300 mm) on center.
  - 3. Space rungs 7 inches (175 mm) from wall surface.
    - a. Unless more stringent conditions are indicated on drawings.
  - 4. Paint color is indicated on drawings.
    - a. Multiple custom colors may be required. Provide colors as specified on drawings, at no additional cost.

## **2.05 PREFABRICATED LADDERS**

- A. Prefabricated Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
  - 1. Components: Manufacturer's standard rails, rungs, treads, handrails, returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
  - 2. Materials: Aluminum; ASTM B211/B211M 6063 alloy, T52 temper.
  - 3. Finish: Manufacturer's standard clear anodized coating, comply with AAMA 611, Class 1.
    - a. Unless alternate color is indicated on drawings.
      - 1) Where paint color is indicated on drawings:
        - (a) Multiple custom colors may be required. Provide colors as specified on drawings, at no additional cost.

## **2.06 LADDER SAFETY SYSTEMS**

- A. Climbing Ladder Fall Arrest System (CLAFS): Comply with 29 CFR 1910.29, 29 CFR 1926.1053, Section 7 of ANSI A14.3 and ANSI/ASSP Z359.16; climbing ladder fall arrest system allows worker to climb up and down using both hands; does not require employee continuously, hold, push, or pull any part of system while climbing.
  - 1. Install on new fixed ladders over 24 feet (7315 mm) in height.
  - 2. Anchorage: Fixed ladder meeting requirements of 29 CFR 1910.23.
  - 3. Rigid Carrier: Fixed galvanized steel U-shaped slotted track with top, bottom and intermediate supports; meeting requirements of ANSI/ASSP Z359.16.
  - 4. Fall Arrestor: Stainless steel and aluminum automatic pass-through carrier sleeve fall arrestor meeting requirements of ANSI/ASSP Z359.15 and ANSI/ASSP Z359.16; compatible with carrier.
- B. Ladder Safety System: Comply with 29 CFR 1910.29, 29 CFR 1926.1053, and Section 7 of ANSI A14.3; ladder safety system allows the worker to climb up and down using both hands; does not require the employee continuously, hold, push, or pull any part of the system while climbing.
  - 1. Install on new fixed ladders over 24 feet (7315 mm) in height.
  - 2. Anchorage: Fixed ladder meeting requirements of 29 CFR 1910.23.

## **2.07 FINISHES - STEEL**

- A. Prime paint steel items.
  - 1. Do not prime surfaces in direct contact with concrete.
  - 2. Do not prime surfaces where field welding is required.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating. ( Provide minimum 530 g/sq m galvanized coating.)
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

## **2.08 FINISHES - ALUMINUM**

- A. Exterior Aluminum Surfaces: Class I natural anodized.
- B. Interior Aluminum Surfaces: Class I natural anodized.
- C. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils (0.018 mm) thick.
- D. Class II Natural Anodized Finish: AAMA 611 AA-M12C22A31 Clear anodic coating not less than 0.4 mils (0.01 mm) thick.
- E. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils (0.018 mm) thick; light bronze.

- F. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils (0.018 mm) thick; light bronze.
- G. Class II Color Anodized Finish: AAMA 611 AA-M12C22A32 Integrally colored anodic coating not less than 0.4 mils (0.01 mm) thick; light bronze.
- H. Class II Color Anodized Finish: AAMA 611 AA-M12C22A34 Electrolytically deposited colored anodic coating not less than 0.4 mils (0.01 mm) thick; light bronze.
- I. Pigmented Organic Coating System: AAMA 2603 polyester or acrylic baked enamel finish; color as indicated.
- J. High Performance Organic Coating System: AAMA 2604 multiple coat, thermally cured fluoropolymer system; color as indicated.
- K. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

## **2.09 FABRICATION TOLERANCES**

- A. Squareness: 1/8 inch (3 mm) maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch (1.5 mm).
- C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5 mm).
- D. Maximum Bow: 1/8 inch (3 mm) in 48 inches (1.2 m).
- E. Maximum Deviation From Plane: 1/16 inch (1.5 mm) in 48 inches (1.2 m).

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Confirm that the ladder structure to which the ladder safety system is installed is capable of withstanding the loads applied by the system in the event of a fall.

### **3.02 PREPARATION**

- A. Clean and strip primed steel items to bare metal and aluminum where site welding is required.
- B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

### **3.03 INSTALLATION**

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Install ladder safety system in accordance with manufacturer's instructions.
- C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Field weld components as indicated on shop drawings.
- E. Perform field welding in accordance with AWS D1.1/D1.1M.
- F. Obtain approval prior to site cutting or making adjustments not scheduled.
- G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

### **3.04 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

**END OF SECTION 055133**

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**SECTION 055213  
PIPE AND TUBE RAILINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wall mounted handrails.
- B. Stair railings and guardrails.
- C. Free-standing railings at steps and ramps.
- D. Balcony railings and guardrails.

**1.02 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 092116 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.
- D. Section 099113 - Exterior Painting: Paint finish.
- E. Section 099123 - Interior Painting: Paint finish.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures 2006.
- 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 A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.
- F. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings 2021.
- G. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.
- H. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172 2019.
- I. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- J. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, 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. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- D. Designer's Qualification Statement.
- E. Fabricator's Qualification Statement.



## **1.05 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. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- C. Fabricator Qualifications:
  - 1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.
  - 2. A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.
  - 3. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

## **PART 2 PRODUCTS**

### **2.01 RAILINGS - GENERAL REQUIREMENTS**

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of applicable local code.
- B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 50 pounds per linear foot (730 N/m) applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
- C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds (890 N) applied at any point on the top of the assembly and in any direction, without damage or permanent set. Intermediate rails, pickets, and posts shall be designed to resist a concentrated load of 50 pounds. 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 welding anchors.
  - 2. For anchorage to masonry, provide brackets to be embedded in masonry, for welding anchors.
  - 3. For anchorage to stud walls, provide backing plates, for welding anchors.
  - 4. Posts: Provide adjustable flanged brackets.
- G. Provide Non-Penetrating mounting for roof railing and guardrail applications.
- H. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

### **2.02 STEEL RAILING SYSTEM**

- A. Steel Tube: ASTM A500/A500M Grade B cold-formed structural tubing.
  - 1. Round pipe is not allowed.
- B. Wall-Mounted / Post-Mounted Handrail Bracket:
  - 1. Stamped steel, extruded style, flat saddle. 1/4 inch thickness, bent square bar. Basis-of-design: Wagner 1978F.
  - 2. Paint-grade or mill finish suitable for field or shop painting.
  - 3. Attachment: Welded.
- C. Guards: Vertical Pickets.
  - 1. Horizontal Spacing: Maximum 4 inches (100 mm) on center.

2. Material: Solid steel bar.
  3. Shape: Square.
  4. Size: 1/2 inch (13 mm) square.
    - a. Unless otherwise required for application.
  5. Top Mounting: Welded to underside of top rail.
  6. Bottom Mounting: Welded to top surface of bottom rail.
- D. Non-Weld Mechanical Fittings: Slip-on, galvanized malleable iron castings, for Schedule 40 pipe, with flush setscrews for tightening by standard hex wrench, no bolts or screw fasteners.
1. Provide components including but not limited to steel tubes / pipes, fittings, and accessories as required to match application as indicated on drawings and as required to provide complete installation.
- E. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- F. Exposed Fasteners: No exposed bolts or screws.
1. Exposed fasteners are not allowed unless specifically indicated on drawings.
- G. Galvanizing: In accordance with requirements of ASTM A123/A123M.
1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic.
- H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

### **2.03 FABRICATION**

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
  1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
  2. Interior Components: Continuously seal joined pieces by continuous welds.
  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.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

### **3.02 PREPARATION**

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.
- C. Apply one coat of bituminous paint to concealed aluminum surfaces that will be in contact with cementitious or dissimilar materials.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- D. Anchor railings securely to structure.

- E. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind welds smooth.
- F. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

#### **3.04 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

**END OF SECTION 055213**

**SECTION 057000  
DECORATIVE METAL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Railing and guardrail assemblies.
  - 1. Decorative metal mesh.
- B. Free-standing railings at steps.

**1.02 RELATED REQUIREMENTS**

- A. Section 017419 - Construction Waste Management and Disposal: Additional requirements for cleaning.
- B. Section 051200 - Structural Steel Framing.
- C. Section 055000 - Metal Fabrications: Supports.
- D. Section 055100 – Metal Stairs.
- E. Section 099113 - Exterior Painting: Paint finish.
- F. Section 099123 - Interior Painting: Paint finish.
- G. Section 133419 - Metal Building Systems: Steel framing and supports as part of Metal Building System.

**1.03 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.
- C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- D. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- E. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- F. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2018).
- G. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- H. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2017.
- I. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- J. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.
- K. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2021.
- L. ASTM A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing 2021.
- M. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- N. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- O. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings 2020.
- P. 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.

- Q. 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.
- R. ASTM B135 - Standard Specification for Seamless Brass Tube 2010.
- S. ASTM B138/B138M - Standard Specification for Manganese Bronze Rod, Bar, and Shapes 2011 (Reapproved 2017).
- T. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- U. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.
- V. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2020.
- W. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements 2022.
- X. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings 2021.
- Y. 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.
- Z. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- AA. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- BB. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.
- CC. AWS C3.4M/C3.4 - Specification for Torch Brazing 2016.
- DD. AWS C3.5M/C3.5 - Specification for Induction Brazing 2016, with Amendment (2017).
- EE. AWS C3.9M/C3.9 - Specification for Resistance Brazing 2020.
- FF. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- GG. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel 2017, with Amendment (2021).
- HH. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.
- II. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Meeting: Schedule and conduct a preinstallation meeting one week before starting work of this section. Attendees shall include, but not be limited to:
  - 1. Contractor.
  - 2. Manufacturer's representative.
  - 3. Owner's representative.
  - 4. Other subcontractors of adjacent work.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, glass, anchors, and accessories.
- C. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.
  - 1. Indicate welded connections using standard AWS welding symbols. Indicate net weld lengths.

2. Include the design engineer's seal and signature on each sheet of shop drawings.
  3. Show interface with adjacent work.
  4. Indicate compliance with specified quality level.
  5. Use same stair names as indicated on drawings.
- D. Samples: Submit one (1) of each item below for each type and condition shown.
1. Railing: 12 inch (305 mm) long section of handrail illustrating color, finish and connection detail.
  2. Cladding: 12 inch by 12 inch (305 mm by 305 mm) sample of each type of cladding, illustrating finish.
- E. Test Reports: Submit test reports from an independent testing agency showing compliance with specified design and performance requirements.
- F. Manufacturer's Installation Instructions.
- G. Maintenance Data: Manufacturer's instructions for care and cleaning.
- H. Manufacturer's Qualification Statement.
- I. Installer's Qualification Statement.
- J. 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.
- K. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- L. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than twenty years of documented experience.
1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least ten years of documented experience.
1. Provide company, field supervisors, and installers that hold active ANSI accredited certifications in appropriate categories for work specified.
    - a. North American Contractor Certification (NACC) for glazing contractors.
    - b. Equivalent independent third-party ANSI accredited certification.
- C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.6/D1.6M no more than 12 months before start of scheduled welding work.
- D. Templates: Supply installation templates, reinforcing, and required anchorage devices.
- E. Design under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- F. Coordination: Coordinate shop primers with topcoats:
1. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

#### **1.07 MOCK-UP**

- A. Provide mock-up of railing system and guardrail, 12 feet long by full height, illustrating each type of material, cladding, and finish.

1. Provide one mock-up for each type of stair and guardrail assembly specified.
- B. See Section 014000 - Quality Requirements for additional requirements.
- C. Locate at Contractor's option.
- D. Mock-up may not remain as part of the work.

#### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in factory-provided protective coverings and packaging.
- B. Protect materials against damage during transit, delivery, storage, and installation at site.
- C. Inspect materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.
- D. Prior to installation, store materials and components under cover in a dry location.

#### **1.09 FIELD CONDITIONS**

- A. Do not install railings until project is enclosed and ambient temperature of space is minimum 65 degrees F (18.3 degrees C) and maximum 95 degrees F (35 degrees C).
- B. Maintain ambient temperature of space at minimum 65 degrees F (18.3 degrees C) and maximum 95 degrees F (35 degrees C) for 24 hours before, during, and after railing installation.

#### **1.10 WARRANTY**

- A. Warranty: Manufacturer's standard one year warranty against defects in materials, fabrication, finishes, and installation commencing on Date of Substantial Completion.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Metal Rail Infill:
  1. Woven wire mesh panels. Basis of Design Profile: McNichols Wire Mesh Item #3621200048.
    - a. [www.mcnichols.com](http://www.mcnichols.com).
  2. Substitutions: See Section 016000 - Product Requirements.

#### **2.02 RAILING SYSTEMS**

- A. Railing Systems - General: Factory- or shop-fabricated in design indicated, to suit specific project conditions, and for proper connection to building structure, and in largest practical sizes for delivery to site.
- B. Performance Requirements: Design and fabricate railings and anchorages to resist the following loads without failure, damage, or permanent set; loads do not need to be applied simultaneously.
  1. Distributed Load on Top Rails: 50 lb/ft (0.73 kN per m) applied in any direction at the top of the handrail, when tested in accordance with ASTM E935.
  2. Concentrated Load on Top Rails: 200 lbs (0.89 kN) applied in any direction at any point along the handrail system, when tested in accordance with ASTM E935.
  3. Concentrated Loads on Infill of Guards: 50 lbs (0.22 kN) applied horizontally on an area of 1 sq ft. (0.093 sq. m).
  4. Handrails: Comply with applicable accessibility requirements of ADA Standards.
  5. Assembly: Join lengths, seal open ends, and conceal exposed mounting bolts and nuts using slip-on non-weld mechanical fittings, flanges, escutcheons, and wall brackets.
  6. Joints: Tightly fitted and secured, machined smooth with hairline seams.
  7. Field Connections: Provide sleeves to accommodate site assembly and installation.
  8. 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.
    - a. Ease exposed edges to a small uniform radius.
    - b. Welded Joints:

- 1) Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.
- 2) Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.
- c. Brass/Bronze Brazed Joints:
  - 1) Perform torch brazing in accordance with AWS C3.4M/C3.4.
  - 2) Perform induction brazing in accordance with AWS C3.5M/C 3.5.
  - 3) Perform resistance brazing in accordance with AWS C3.9M/C3.9.
- C. Metal Railing: Engineered, post-supported railing system with metal infill.
  1. Configuration: Guardrail with separate handrail.
  2. Decorative Flanges for Embedded Posts: Square, collared cover plate without screw holes.
  3. Wall Mounted Components: Components necessary to support railing with 1-1/2 inch (38 mm) clearance from wall, and as follows:
    - a. Underslung support brackets: Supports at 60 inches (1524 mm), maximum.
    - b. Wall return without support: Terminates 1/4 inch (6 mm) from side wall.
  4. Handrail Brackets: Same metal as railing.
  5. Fasteners: Concealed.
  6. Infill at Mesh Railings: Metal mesh panels.
    - a. Wire Size: 0.120 inch (3 mm).11 gauge.
    - b. Wire Spacing: 2x1 inch (50x25 mm). 84 percent open area.
    - c. Panel Size: 48 inches by 96 inches. Cut panels to sizes indicated on drawings.
      - 1) Provide custom sizes as required for applications as indicated on drawings.
    - d. Accessories: Manufacturer's standard U-edging and custom fabricated edging and trim as required for applications and profiles indicated on drawings.
  7. Custom Fabricated Infill at Metal Tube Railings:
    - a. Material: Steel tube.
  8. Shapes, sizes and profile as required for application and as indicated on drawings.
  9. End and Intermediate Posts: As shown on drawings.
    - a. Horizontal Spacing: As indicated on drawings.
    - b. Mounting: Welded.

## 2.03 MATERIALS

- A. Aluminum Components: ASTM B221 or ASTM B221M.
  1. Clear Anodized Finish: Class I, AAMA 611 AA-M12C22A41 Clear anodic coating with electrolytically deposited organic seal; not less than 0.7 mils (0.018 mm) thick.
  2. Color Anodized Finish: Class I, AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils (0.018 mm) thick.
  3. High-Performance Organic Finish: AAMA 2604; multiple coats, thermally cured fluoropolymer system.
- B. Steel Components:
  1. Sections, Shapes, Plate and Bar: ASTM A36/A36M.
  2. Tubing: ASTM A501/A501M structural tubing, round and shapes as indicated.
  3. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
    - a. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
    - b. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).
  4. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230 with G40/Z120 coating.
  5. Iron Castings: ASTM A47/A47M, malleable.
  6. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
  7. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- C. Stainless Steel Components:
  1. ASTM A666, Type 304.
  2. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.



3. Stainless Steel Finish: No. 4, brushed.

## **2.04 ACCESSORIES**

- A. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground smooth.
- B. Anchors and Fasteners: Provide anchors and other materials 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 bolt anchors.
  2. For anchorage to masonry, provide brackets to be embedded in masonry for bolt anchors.
  3. For anchorage to stud walls, provide backing plates for bolt anchors.
  4. Exposed Fasteners: No exposed bolts or screws.
- C. Carbon Steel Bolts and Nuts: ASTM A307.
- D. Hydraulic Expansion Cement: ASTM C1107/C1107M.
- E. Bituminous Coating: Cold-applied asphalt mastic, noncorrosive compound free of asbestos, sulfur, and other deleterious impurities; 0.015 inch (0.4 mm) dry film thickness per coat.
- F. Sealant: Silicone; Match specified finish color.
- G. Finish Touch-Up Materials: As recommended by manufacturer for field application.
- H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate and site conditions are acceptable and ready to receive work.
- B. Verify field dimensions of locations and areas to receive work.
- C. Notify Architect immediately of conditions that would prevent satisfactory installation.
- D. Do not proceed with work until detrimental conditions have been corrected.
- E. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates, and supports for attachment of anchors.

### **3.02 PREPARATION**

- A. Protect existing work.
- B. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions, and directions for installation of anchorages and fasteners.
- C. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

### **3.03 INSTALLATION**

- A. Comply with manufacturer's drawings and written instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, and with tight joints, except where necessary for expansion.
- C. Anchor securely to structure.
- D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- 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.
- F. Isolate dissimilar materials with bituminous coating, bushings, grommets, or washers to prevent electrolytic corrosion.

#### **3.04 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch (6 mm) per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch (6 mm).
- C. Maximum Out-of-Position: 1/4 inch (6 mm).

#### **3.05 FIELD QUALITY CONTROL**

- A. Field Services: Provide the services of the manufacturer for field observation of installation of railings.

#### **3.06 CLEANING**

- A. Remove protective film from exposed metal surfaces.
- B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents, or other substances that may damage the material or finish.
- C. Glass and Glazing: Clean glazing surfaces; remove excess glazing sealant compounds, dirt, and other substances.
- D. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

#### **3.07 PROTECTION**

- A. Protect installed components and finishes from damage after installation.
- B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.
  1. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

**END OF SECTION 057000**

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**SECTION 061000  
ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Sheathing.
- B. Underlayment.
- C. Roof-mounted curbs.
- D. Roofing nailers.
- E. Roofing cant strips.
- F. Preservative treated wood materials.
- G. Fire retardant treated wood materials.
- H. Miscellaneous framing and sheathing.
- I. Concealed wood blocking, nailers, and supports.
- J. Miscellaneous wood nailers, furring, and grounds.
- K. Fire-Retardant Treated Wood roof decking and / or framing to match existing construction where indicated or required to remain.

**1.02 RELATED REQUIREMENTS**

- A. Section 055000 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.
- B. Section 072500 - Weather Barriers: Water-resistive barrier over sheathing.
- C. Section 076200 - Sheet Metal Flashing and Trim: Sill flashings.
- D. Section 077200 - Roof Accessories: Prefabricated roof curbs.
- E. Section 092116 - Gypsum Board Assemblies: Gypsum-based sheathing.

**1.03 REFERENCE STANDARDS**

- A. ANSI A208.1 - American National Standard for Particleboard 2022.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing 2003 (Reapproved 2017).
- D. ASTM D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing 2010 (Reapproved 2017).
- E. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing 2019a.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- G. AWWA U1 - Use Category System: User Specification for Treated Wood 2022.
- H. PS 1 - Structural Plywood 2009 (Revised 2019).
- I. PS 2 - Performance Standard for Wood Structural Panels 2018.
- J. PS 20 - American Softwood Lumber Standard 2021.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, 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. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.
- E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

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

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

#### **1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

### **PART 2 PRODUCTS**

#### **2.01 GENERAL REQUIREMENTS**

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
  - 1. Species: Douglas Fir-Larch, unless otherwise indicated.
  - 2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
  - 3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee ([www.alsc.org](http://www.alsc.org)) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
  - 4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.
- B. Provide sustainably harvested wood; see Section 016000 - Product Requirements for requirements.
- C. Provide wood harvested within a 500 mile (805 km) radius of the project site, where possible.
- D. Lumber salvaged from deconstruction or demolition of existing buildings or structures is permitted provided it is clean, denailed, and free of paint and finish materials, and other contamination; identify source.
- E. Lumber fabricated from recovered timber (abandoned in transit) is permitted, unless otherwise noted, provided it meets the specified requirements for new lumber and is free of contamination; identify source.

#### **2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS**

- A. Sizes: Nominal sizes as indicated on drawings and as required for Project, S4S.
- B. Moisture Content: S-dry or MC19.
- C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
  - 1. Lumber: S4S, No. 2 or Standard Grade.
  - 2. Boards: Standard or No. 3.

#### **2.03 STRUCTURAL COMPOSITE LUMBER**

- A. At Contractor's option, structural composite lumber may be substituted for concealed dimension lumber and timbers.
- B. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.

## **2.04 CONSTRUCTION PANELS**

- A. Underlayment: APA Underlayment; plywood, Exposure 1, 1/2 inch (12.5 mm) thick. Fully sanded faces at resilient flooring.
- B. Wall Sheathing, For Inside face of parapet walls with LWIC roofing, or where required by roofing type, and where indicated on drawings: Any PS 2 type.
  - 1. Bond Classification: Exterior.
  - 2. Grade: Structural I Sheathing.
  - 3. Span Rating: 16.
  - 4. Performance Category: 3/4 PERF CAT.
  - 5. Edge Profile: Contractor's option to suite application.

## **2.05 ACCESSORIES**

- A. Fasteners and Anchors:
  - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
  - 2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
    - a. Not allowed at exterior applications.
- B. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.
- C. Water-Resistive Barrier: As specified in Section 072500.

## **2.06 FACTORY WOOD TREATMENT**

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
  - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
  - 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Fire Retardant Treatment:
  - 1. Exterior Type: AWWA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
    - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
    - b. Treat all exterior rough carpentry items.
    - c. Do not use treated wood in direct contact with the ground.
  - 2. Interior Type A: AWWA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
    - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
    - b. Treat rough carpentry items as indicated .
    - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
  - 1. Preservative Pressure Treatment of Lumber Above Grade: AWWA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
    - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.

- b. Treat lumber exposed to weather.
  - c. Treat lumber in contact with roofing, flashing, or waterproofing.
  - d. Treat lumber in contact with masonry or concrete.
  - e. Treat lumber less than 18 inches (450 mm) above grade.
- 2. Preservative Pressure Treatment of Plywood Above Grade: AWP A U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
  - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
  - b. Treat plywood in contact with roofing, flashing, or waterproofing.
  - c. Treat plywood in contact with masonry or concrete.
  - d. Treat plywood less than 18 inches (450 mm) above grade.
- 3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWP A 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.
  - b. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

## **PART 3 EXECUTION**

### **3.01 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.

### **3.02 BLOCKING, NAILERS, AND SUPPORTS**

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- F. Provide the following specific non-structural framing and blocking:
  - 1. Cabinets and shelf supports.
  - 2. Wall brackets.
  - 3. Handrails.
  - 4. Grab bars.
  - 5. Towel and bath accessories.
  - 6. Wall-mounted door stops.
  - 7. Chalkboards and marker boards.
  - 8. Additional locations as indicated on Drawings or as required for project.
  - 9. Wall paneling and trim.
  - 10. Joints of rigid wall coverings that occur between studs.

### **3.03 ROOF-RELATED CARPENTRY**

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at all roof openings except where prefabricated curbs are specified and where specifically indicated otherwise. Form corners by alternating lapping side members.
- C. Contractor to evaluate existing wood roof decking / framing at existing gym building. Repair or replace all damaged or deteriorated wood in-kind to match existing unless more stringent requirements are indicated on structural drawings.

#### **3.04 INSTALLATION OF CONSTRUCTION PANELS**

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
  - 1. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.

#### **3.05 CLEANING**

- A. Waste Disposal: Comply with the requirements of Section 017419 - Construction Waste Management and Disposal.
  - 1. Comply with applicable regulations.
  - 2. Do not burn scrap on project site.
  - 3. Do not burn scraps that have been pressure treated.
  - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

**END OF SECTION 061000**



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**SECTION 061323  
HEAVY TIMBER FRAMING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Heavy structural timber for posts, beams and trusses.
  - 1. Locations are indicated on drawings.
- B. Connection hardware.

**1.02 REFERENCE STANDARDS**

- A. AITC 108 - Standard for Heavy Timber Construction 1993.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- D. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.
- E. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- F. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber 2019.
- G. WWPA G-5 - Western Lumber Grading Rules 2021.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate dimensions, wood species and grades, component profiles, drilled holes, fasteners, connectors, erection details and sequence.
  - 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. Product Data: Submit data on proprietary connection devices.
- D. Product Data: Submit technical data on wood preservative materials, application instructions.

**1.04 QUALITY ASSURANCE**

- A. Designer Qualifications: Design members under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Lumber Grading Agency: Certified by American Lumber Standards Committee.

**PART 2 PRODUCTS**

**2.01 REGULATORY REQUIREMENTS**

- A. Comply with applicable codes for loading, seismic zoning, fire retardant criteria, and other governing load criteria.

**2.02 WOOD MATERIALS**

- A. Wood fabricated from old growth timber is not permitted.
- B. Lumber Grading Rules: As indicated.
- C. Lumber: Stress group: As indicated.

**2.03 FABRICATION**

- A. Fabricate components in accordance with AITC 108, with joints neatly fitted, welded, and ground smooth.
- B. Perform welding in accordance with AWS D1.1/D1.1M.

**2.04 ACCESSORIES**

- A. Connectors: Type weldable steel.
  - 1. Prime connectors, except where cast in concrete.
- B. Bolts, Nuts, Washers, Lags, and Screws, Untreated Wood: Medium carbon steel; galvanized coating per ASTM A153/A153M; size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, and Screws, Preservative-Treated Wood: Stainless steel; size and type to suit application.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Ensure that steel support fabrications are installed in correct locations and anchored securely.

#### **3.02 ERECTION**

- A. Set structural members level and plumb, in correct position.
- B. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Do not field cut or alter structural members without approval of Architect.
- D. After erection, touch-up primed surfaces with primer.

**END OF SECTION 061323**

**SECTION 062000  
FINISH CARPENTRY**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Finish carpentry items.
  - 1. Finish carpentry items are indicated on drawings.

**1.02 RELATED REQUIREMENTS**

- A. Section 061000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 064100 - Architectural Wood Casework: Shop fabricated custom cabinet work.
- C. Section 081416 - Flush Wood Doors.
- D. Section 099123 - Interior Painting: Painting and Finishing of finish carpentry items.

**1.03 REFERENCE STANDARDS**

- A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- 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. AWPA U1 - Use Category System: User Specification for Treated Wood 2022.
- F. BHMA A156.9 - Cabinet Hardware 2020.
- G. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2020.
- H. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- I. PS 1 - Structural Plywood 2009 (Revised 2019).

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with plumbing rough-in, electrical rough-in, installation of associated and adjacent components, and other items as indicated on drawings.
- B. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data:
  - 1. Provide manufacturer's product data, storage and handling instructions for factory-fabricated units.
  - 2. Provide data on fire retardant treatment materials and application instructions.
  - 3. Provide instructions for attachment hardware.
- C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, seam locations, pattern orientation, installation methods, corner conditions, details and accessories.
  - 1. Indicate interface with adjacent work.
    - a. Scale of Drawings: 1-1/2 inch to 1 foot (125 mm to 1 m), minimum.
    - b. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
    - c. Include certification program label.
    - d. Include other finish carpentry items indicated on drawings.
- D. Manufacturer's Instructions: Provide manufacturer's installation instructions for factory-fabricated units.

## **1.06 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum ten years of documented experience.
  - 1. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
- B. Quality Certification:
  - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: [www.awiqcp.org](http://www.awiqcp.org).
  - 2. Provide labels or certificates indicating that the work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
  - 3. Provide designated labels on shop drawings as required by certification program.
  - 4. Provide designated labels on installed products as required by certification program.
  - 5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

## **1.07 MOCK-UP**

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Locate as indicated on drawings.
- C. Mock-up may remain as part of the Work.

## **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver factory-fabricated units to project site in original packages, containers or bundles bearing brand name and identification.
- B. Store finish carpentry items under cover, elevated above grade, and in a dry, well-ventilated area not exposed to heat or sunlight.
- C. Protect from moisture damage.
- D. Handle materials and products to prevent damage to edges, ends, or surfaces.
- E. Follow manufacturer's recommendations.

## **PART 2 PRODUCTS**

### **2.01 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. As indicated on drawings.

### **2.02 WOOD-BASED COMPONENTS**

- A. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless indicated otherwise, and provided it is clean and free of contamination, identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc. (ALSC).

### **2.03 LUMBER MATERIALS**

- A. Hardwood Lumber: White Oak species, plain sawn, maximum moisture content of 6 percent ; with vertical grain , of quality suitable for transparent finish.

### **2.04 SHEET MATERIALS**

- A. Softwood Plywood, Not Exposed to View: Any face species, medium density fiberboard core; PS 1 Grade A-B, glue type as recommended for application.

- B. Hardwood Plywood: Face species as indicated, plain sawn, balance matched, medium density fiberboard core; HPVA HP-1 Front Face Grade AA, Back Face Grade 1, glue type as recommended for application.

## **2.05 PLASTIC LAMINATE MATERIALS**

- A. Plastic Laminate: NEMA LD 3; color as indicated.
- B. Laminate Adhesive: Type recommended by laminate manufacturer to suit application; not containing formaldehyde or other volatile organic compounds.

## **2.06 FASTENINGS**

- A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.
- B. Adhesive for factory-fabricated units: Manufacturer's recommended adhesive for application.
- C. Concealed Joint Fasteners: Threaded steel.

## **2.07 ACCESSORIES**

- A. Adhesive: Type recommended by fabricator to suit application.
  - 1. Unless more stringent conditions are indicated on drawings.
- B. Lumber for Shimming and Blocking: Softwood lumber of any species.
- C. Wood Filler: Solvent base, tinted to match surface finish color.
- D. As indicated on drawings.

## **2.08 HARDWARE**

- A. Hardware: Comply with BHMA A156.9.

## **2.09 WOOD TREATMENT**

- A. Factory-Treated Lumber: Comply with requirements of AWWA U1 - Use Category System for pressure impregnated wood treatments determined by use categories, expected service conditions, and specific applications.
- B. Wood Preservative by Pressure Treatment (PT Type): Provide AWWA U1 treatment using waterborne preservative with 0.25 percent retainage.
- C. Shop pressure treat wood materials requiring fire rating to concealed wood blocking.
- D. Provide identification on fire retardant treated material.
- E. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.
- F. Kiln dry wood after pressure treatment to maximum percent moisture content as recommended by manufacturer.

## **2.10 SITE FINISHING MATERIALS**

- A. Stain, Shellac, Varnish, and Finishing Materials: In compliance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

## **2.11 FABRICATION**

- A. Shop assemble work for delivery to site, permitting passage through building openings.
- B. Fit exposed sheet material edges with 3/8 inch matching hardwood (9 mm matching hardwood) edging. Use one piece for full length only.
- C. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- D. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- E. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs. (Locate counter butt joints minimum 600 mm from sink cut-outs.)
  - 1. Unless otherwise indicated on drawings.

## **2.12 SHOP FINISHING**

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler that matches surrounding surfaces and is of type recommended for the applicable finish.
- D. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
  - 1. Transparent:
    - a. System - 1, Lacquer, Nitrocellulose.
    - b. Sheen: Flat.
    - c. Unless otherwise indicated on drawings.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

### **3.02 INSTALLATION**

- A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Install factory-fabricated units in accordance with manufacturer's printed installation instructions.
- C. Set and secure materials and components in place, plumb and level.
- D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim to conceal larger gaps.

### **3.03 PREPARATION FOR SITE FINISHING**

- A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

### **3.04 TOLERANCES**

- A. Maximum Variation from True Position: 1/16 inch (1.6 mm).
- B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch (0.79 mm).

**END OF SECTION 062000**

**SECTION 064100**  
**ARCHITECTURAL WOOD CASEWORK**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Specially fabricated cabinet units.
- B. Specially fabricated built-in elements.
  - 1. Locations and types are indicated on drawings.
- C. Hardware.
- D. Factory finishing.
- E. Preparation for installing utilities.

**1.02 RELATED REQUIREMENTS**

- A. Section 061000 - Rough Carpentry: Support framing, grounds, and concealed blocking.
- B. Section 123600 - Countertops: Countertops and, support brackets.

**1.03 REFERENCE STANDARDS**

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- B. AWI (QCP) - Quality Certification Program Current Edition.
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- D. BHMA A156.9 - Cabinet Hardware 2020.
- E. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood 2020.
- F. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- G. UL (DIR) - Online Certifications Directory Current Edition.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
  - 1. Scale of Drawings: 1-1/2 inch to 1 foot (125 mm to 1 m), minimum.
  - 2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
  - 3. Show all material joint locations on Shop Drawings.
  - 4. Show all material grain or pattern direction and orientation on Shop Drawings.
  - 5. Show support framing where indicated as part of assembly on Shop Drawings.
- C. Product Data: Provide data for hardware accessories.
- D. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, locksets, and edge banding, demonstrating hardware design, quality, and finish.
  - 1. Submit 8 inch by 10 inch samples of all specified plastic laminate colors and finishes, including standard and custom colors and finishes.
  - 2. Submit sample of edge banding applied to cabinet door, 12 inches by 12 inches.
- E. Sustainable Design Submittal: Documentation for sustainably harvested wood-based components.
- F. Show locations and sizes of cutouts and items installed in architectural wood casework.
- G. Show interface with adjacent work, including mechanical, electrical and plumbing work.
  - 1. Show under-cabinet lighting, where indicated.



- a. Show methods to conceal under-cabinet lighting from view.
2. Show appliances or equipment integral or within casework or where openings in casework are required.

## **1.06 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum ten years of documented experience.
  1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
  2. Single Source Responsibility: Provide and install this work from single fabricator.

## **1.07 MOCK-UP**

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, plumbing accessories, and countertops.
- B. See Section 014000 - Quality Requirements for additional requirements.
- C. Locate as indicated on drawings or where directed.
- D. Mock-up may remain as part of the Work.

## **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Protect units from moisture damage.

## **1.09 FIELD CONDITIONS**

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

# **PART 2 PRODUCTS**

## **2.01 CABINETS**

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Faced Cabinets: Custom grade.
  1. Types, profiles and finishes are indicated on drawings.
  2. Provide PLAM closure panels flush with face of upper cabinet door(s) to underside of ceiling.
- C. Cabinets:
  1. Finish - Exposed Exterior Surfaces: Wood Decorative laminate.
  2. Finish - Exposed Interior Surfaces: White melamine.
  3. Finish - Semi-Exposed Surfaces: White melamine.
  4. Finish - Concealed Surfaces: Manufacturer's option.
  5. Door and Drawer Front Edge Profiles: Square edge with thick applied band.
    - a. Design intent is to match exposed exterior surface color, unless otherwise indicated.
    - b. Edge band thickness: 3mm.
    - c. Edge band material: PVC.
  6. Adjustable Shelving Inside Cabinets: Square edge with thick applied band.
    - a. Design intent is to match exposed interior surface color, unless otherwise indicated.
    - b. Edge band thickness: 3mm at front face.
    - c. Edge band material: PVC.
  7. Door and Drawer Front Retention Profiles: Fixed panel.
    - a. Unless otherwise indicated on drawings.
  8. Casework Construction Type: Type A - Frameless.
  9. Grained Face Layout for Cabinet and Door Fronts: Style and Rail, all Grades.
    - a. Doors: Vertical grain.
  10. Grained Face Layout for Cabinet and Door Fronts: Flush panel.
    - a. Custom Grade: Doors, drawer fronts and false fronts wood grain to run and match vertically within each cabinet unit.

11. Adjustable Shelf Loading: 50 lbs. per sq. ft.
  - a. Deflection: L/144.
12. Cabinet Style: Flush overlay.
13. Cabinet Doors and Drawer Fronts: Flush style and as indicated.

## **2.02 WOOD-BASED COMPONENTS**

- A. Wood fabricated from old growth timber is not permitted.
- B. Medium Density Fiberboard:
  1. Sustainable Medium Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde (NAF), MR-10, FSC certified.
    - a. Basis-of-Design: "Arreis" MDF by Roseburg.
  2. Sustainable Moisture Resistant Medium Density Fiberboard: ANSI A208.2-2009, Grade 155, made with binder containing no urea formaldehyde (NAF), MR-50, FSC certified.
    - a. Basis-of-Design: "Medex" MDF by Roseburg.
    - b. Locations: Within 10 feet of any plumbing fixture.
- C. Medium Density Particleboard:
  1. Medium Density Particleboard: ANSI 208.1, Industrial Grade M3, made with binder containing no urea formaldehyde (NAF) or ultra low emitting formaldehyde (ULEF), MR-10, FSC certified.
    - a. Basis-of-Design: "Collins Pine Free-Form" by Collins Wood or "SkyBlend" particleboard by Roseburg.
  2. Medium Density Particleboard: ANSI 208.1, Industrial Grade M3, made with binder containing no urea formaldehyde (NAF), MR-50, FSC certified.
    - a. Basis-of-Design: "Collins Pine Free-Form MR50 Particleboard" by Collins Wood.
    - b. Locations: Within 10 feet of any plumbing fixture.
- D. Provide sustainably harvested wood, certified or labeled as specified in Section 016000.
- E. Provide wood harvested within a 500 mile (805 km) radius of the project site, where possible.
- F. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless otherwise noted, provided it is clean and free of contamination; identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc.

## **2.03 LAMINATE MATERIALS**

- A. Manufacturers:
  1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Formica Corporation: [www.formica.com](http://www.formica.com).
    - b. Panolam Industries International, Inc: [www.panolam.com](http://www.panolam.com).
    - c. Wilsonart LLC: [www.wilsonart.com](http://www.wilsonart.com).
    - d. Substitutions: See Section 016000 - Product Requirements.
- B. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.
- C. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- D. Provide specific types as indicated.

## **2.04 COUNTERTOPS**

- A. Countertops are specified in Section 123600.

## **2.05 ACCESSORIES**

- A. Adhesive: Type recommended by fabricator to suit application.
  1. Unless more stringent requirements are indicated or required for application.
- B. Fasteners: Size and type to suit application.

- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
  - 1. Satin or brushed finish, unless otherwise indicated.
- D. Concealed Joint Fasteners: Threaded steel.
- E. Grommets: Standard pre-finished metal grommets for cut-outs, in color as selected from manufacturer's full range.
  - 1. Basis-of-Design: One-piece, round, 2-1/2 inch diameter, metal grommet by Hafele, series 429.
  - 2. Located as required for mechanical, electrical or plumbing work and as required for IT / Data work by Owner and / or as directed by Owner.
- F. Additional accessories are indicated on drawings.

## 2.06 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards and coordinated self rests, satin chrome or white factory-applied, textured powder coat where inside cabinets finish, for nominal 1 inch (25 mm) spacing adjustments.
- C. Adjustable Shelf Supports: Standard back-mounted system using recessed metal shelf standards and coordinated cantilevered shelf brackets, satin chrome or white factory-applied, textured powder coat where inside cabinets finish, for nominal 1 inch (25 mm) spacing adjustments.
- D. Fixed Specialty Shelf Supports:
  - 1. Material: Steel.
  - 2. Manufacturer's standard, factory-applied, textured powder coat.
  - 3. Style: Low profile, hidden bracket.
  - 4. Color: Satin chrome.
    - a. Unless otherwise indicated on drawings.
- E. Fixed Specialty Workstation and Countertop Brackets: As specified in Section 123600 - Countertops.
- F. Fixed Americans with Disabilities Act (ADA)-Compliant Vanity and Countertop Brackets: As specified in section 123600 - Countertops.
- G. Fixed Specialty Vanity Brackets: As specified in Section 123600 – Countertops.
- H. Countertop Supports: As specified in Section 123600 – Countertops.
- I. Drawer and Door Pulls: "U" shaped specialty pull, zinc die cast with satin nickel finish, 5-1/6 inch center to center.
  - 1. Basis of Design Product: Hardware Resources, Jeffrey Alexander: Avlar 5-1/16 inch cabinet pull. Model: 264-128SN.
- J. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with satin finish.
  - 1. Locations: As indicated on drawings.
- K. Catches: Magnetic Touch type.
- L. Drawer Systems: Integrated drawer slide and side.
  - 1. Side Type: Double wall, metal.
    - a. Provide maximum lengths and heights possible in order to suit application and drawer face dimensions or profiles indicated on drawings.
  - 2. Extension Type: Extension types as required Extension types as indicated.
  - 3. Static Load Capacity: Heavy Duty grade.
  - 4. Stops: Integral type.
  - 5. Features: Provide self closing/stay closed and graphite finish type.
  - 6. Manufacturers:
    - a. Grass America Inc; Nova Pro Scala: [www.grassusa.com](http://www.grassusa.com).

- b. Other manufacturers are allowed subject to requirements indicated.
  - c. Substitutions: See Section 016000 - Product Requirements.
- M. Hinges: European style concealed self-closing type, steel with satin finish.
- N. Soft Close Adapter: Concealed, frame-mounted, screw-adjustable damper ; steel with satin finish.
- O. Hanging rod: Steel, satin nickel finish.
  - 1. Sizes as required for application.
  - 2. Locations and mounting heights are indicated on drawings.
    - a. Install 10 inches from back face of cabinet and 2-1/2 inches below top of upper shelf, unless otherwise indicated on drawings.

## **2.07 SHOP TREATMENT OF WOOD MATERIALS**

- A. Provide UL (DIR) listed and approved identification on fire retardant treated material.
- B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

## **2.08 FABRICATION**

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs. (Locate counter butt joints minimum 600 mm from sink cut-outs.)
  - 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
- E. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, fixtures and fittings, and as indicated or required. Verify locations of cutouts from on-site dimensions. Seal cut edges.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

### **3.02 INSTALLATION**

- A. Install work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.
- B. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- C. Use fixture attachments in concealed locations for wall mounted components.
- D. Use concealed joint fasteners to align and secure adjoining cabinet units.
- E. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch (0.79 mm). Do not use additional overlay trim for this purpose.
- F. Secure cabinets to floor using appropriate angles and anchorages.

### **3.03 ADJUSTING**

- A. Test installed work for rigidity and ability to support loads.
- B. Adjust moving or operating parts to function smoothly and correctly.

### **3.04 CLEANING**

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

## **END OF SECTION 064100**

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**SECTION 072500  
WEATHER BARRIERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

1. Vapor permeable.
2. Locations are indicated on drawings: Air / Moisture Barrier.
3. Fluid applied.
  - a. Contractor may use membrane products where allowable by exterior material manufacturer in lieu of fluid applied.
    - 1) Required membrane locations include all outside corners, six inches on each side and as indicated on drawings.
  - b. Plastic sheet products, felt or building paper is not allowed.
  - c. High-Temperature (240 deg F, minimum) at metal walls or roof materials and where indicated or required by cladding manufacturer.

**1.02 RELATED REQUIREMENTS**

**1.03 RELATED REQUIREMENTS**

- A. Section 076200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.
- B. Section 079200 - Joint Sealants: Sealing building expansion joints.

**1.04 DEFINITIONS**

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.

**1.05 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. AATCC Test Method 127 - Test Method for Water Resistance: Hydrostatic Pressure 2018, with Editorial Revision (2019).
- C. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension 2016 (Reapproved 2021).
- D. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2021.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022.
- G. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials 2021a.
- H. ICC-ES AC308 - Acceptance Criteria for Water-Resistive Barriers 2016, with Editorial Revision (2019).
- I. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials 2017.
- J. ICC-ES AC212 - Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing 2015.
- K. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components 2023.

**1.06 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics.

- C. Shop Drawings: Provide drawings of special joint conditions.
  - 1. Provide project-specific details for all application types.
  - 2. Show interface with adjacent work.
  - 3. Clarify work as part of this Section and by other Sections.
- D. Submit five previous projects of similar size and scope to work specified.
- E. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.
- F. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.
- G. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification; keep copies of each contractor accreditation and installer certification on site during and after installation, and present on-site documentation upon request.
- H. Testing Agency Qualification Statement.

### **1.07 QUALITY ASSURANCE**

- A. Follow Air Barrier Association of America (ABAA) Quality Assurance Program (QAP) recommendations; [www.airbarrier.org/#sle](http://www.airbarrier.org/#sle).
- B. Installer Qualification: Installer Qualifications: Company specializing in performing work of type specified and with at least ten years documented experience.
- C. Manufacturer Qualification: Use materials from a single manufacturer regularly engaged in air barrier material manufacture, and use secondary materials approved in writing by primary material manufacturer.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

### **1.08 MOCK-UP**

### **1.09 FIELD CONDITIONS**

- A. Install Air / Moisture Barrier materials in integrated exterior mock-up specified in Section 014000.
- B. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

## **PART 2 PRODUCTS**

### **2.01 WEATHER BARRIER ASSEMBLIES**

- A. Air / Moisture Barrier: Provide on exterior walls under exterior cladding and where indicated in other sections.
  - 1. Provide continuous air / moisture barrier throughout entire building envelope, including horizontal to vertical transitions and under different finish materials. Seal all penetrations air and water tight.
  - 2. Continuous air / moisture barrier is required at all locations whether or not shown on drawings.
- B. Contractor to coordinate the compatibility of all system components with insulation and other materials. Provide accessory materials as required for a complete assembly.
- C. Seal all building envelope seams, gaps and material transitions air-tight.

### **2.02 SEALANTS**

- A. All sealants to comply with ASTM C920, elastomeric polymer sealant to maintain watertight condition.
- B. Primers, Cleaners, and Other Sealant Materials: As recommended by sealant manufacturer, appropriate to application, and compatible with adjacent materials.

### **2.03 ADHESIVES**

- A. Provide adhesive recommended by manufacturer.

## **2.04 ACCESSORIES**

- A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
- B. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970.
- C. Flexible Flashing: Sheathing fabric saturated with air barrier coating and complying with the applicable requirements of ICC-ES AC148.
- D. Pre-formed Transition Membrane: Semi-rigid silicone or polyester composition, tapered edges, tear resistant.
- E. Liquid Flashing: One part, fast curing, non-sag elastomeric STPU (Silyl-Terminated Polyurethane) gun grade, trowelable liquid flashing.
- F. Stainless Steel Flashing: Flexible flashing with 8 mil, 0.008 inch (0.203 mm) thick sheet of Type 304 stainless steel, 8 mil, 0.008 inch (0.203 mm) of butyl adhesive and a siliconized release liner.
- G. Sheet Membrane Mounting Tape: Double-sided strip of pressure-sensitive, acrylic adhesive reinforced with embedded fiber-strand carrier layer and plastic backing.
  - 1. Width: 3/4 inch (19 mm).
  - 2. Roll Length: 164 feet (50 m).
  - 3. Thickness: 14 mil, 0.014 inch (0.356 mm).
- H. Liquid Flashing: One part, fast curing, non-sag, gun grade, trowelable liquid flashing.
- I. Thinners and Cleaners: As recommended by material manufacturer.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that surfaces and conditions are ready to accept the work of this section.

### **3.02 PREPARATION**

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's instructions.

### **3.03 INSTALLATION**

- A. Install materials in accordance with manufacturer's instructions.
- B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- D. Self-Adhered Sheets:
  - 1. Prepare substrate in manner recommended by sheet manufacturer; fill and tape joints in substrate and between dissimilar materials.
  - 2. Lap sheets shingle-fashion to shed water and seal laps air tight.
  - 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 for the purpose, to seal to adjacent construction and as flashing.
  - 5. At wide joints, provide extra flexible membrane allowing joint movement.
- E. Coatings:
  - 1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.



2. Where exterior masonry veneer is to be installed, install masonry anchors before installing weather barrier over masonry; seal around anchors air tight.
  3. Mastic Coating: Install by trowel or roller to minimum thickness of 1/4 inch (6 mm); use sheet seal to join to adjacent construction, seal air tight with sealant.
  4. Use flashing to seal to adjacent construction and to bridge joints.
- F. Openings and Penetrations in Exterior Weather Barriers:
1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches (125 mm) onto weather barrier and at least 6 inches (150 mm) up jambs; mechanically fasten stretched edges.
  2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches (100 mm) wide; do not seal sill flange.
  3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches (230 mm) wide, covering entire depth of framing.
  4. At head of openings, install flashing under weather barrier extending at least 2 inches (50 mm) beyond face of jambs; seal weather barrier to flashing.
  5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
  6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Coordination of ABAA Tests and Inspections:
  1. Provide testing and inspection required by ABAA QAP.
  2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
  3. Cooperate with ABAA testing agency.
  4. Allow access to air barrier work areas and staging.
  5. Do not cover air barrier work until tested, inspected, and accepted.
- C. Do not cover installed weather barriers until required inspections have been completed.
- D. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.
- E. Take digital photographs of each portion of the installation prior to covering up.

### **3.05 PROTECTION**

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

### **END OF SECTION 072500**

**SECTION 074213  
METAL WALL PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Manufactured metal panels for exterior wall panels, soffit panels, and subgirt framing assembly, with related flashings and accessory components.
  - 1. General: Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Downspouts adjacent to metal wall panels

**1.02 RELATED REQUIREMENTS**

- A. Section 054000 - Cold-Formed Metal Framing: Wall panel substrate.
- B. Section 072500 - Weather Barriers: Weather barrier under wall panels.
- C. Section 077123 - Manufactured Gutters and Downspouts: Downspout boots.
- D. Section 079200 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.

**1.03 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. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document) 2015.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Storage and handling requirements and recommendations.
  - 2. Installation methods.
  - 3. Include installation instructions.
- C. Shop Drawings: Indicate dimensions, layout, joints, construction details, details of edge and penetration conditions, spacing and type of connections, flashings and special conditions, and methods of anchorage.
  - 1. Include downspouts.
  - 2. Include accessories.
  - 3. Include project-specific details.
  - 4. Show work to be field-fabricated or field-assembled.
  - 5. Show interface with other work.
  - 6. Show all proposed seam and joint locations.
  - 7. Do not use architect's drawings as shop drawings.
  - 8. Scale of shop drawing details not less than 3" = 1'-0".
  - 9. Show drawings, text and dimensions in black and white at a clear legible scale and size.
    - a. Color drawings that are not clearly legible will be returned without review.
- D. Samples: Submit two samples of wall panel, 12 inch by 12 inch (305 mm by 305 mm) in size illustrating finish color, sheen, and texture.
- E. Manufacturer's Qualification Statement.

- F. Installer's Qualification Statement.
- G. Calculations:
  - 1. Include calculations with registered engineer seal, verifying wall panel and attachment methods resist wind pressures imposed on it pursuant to applicable building codes.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years of documented experience.
- B. Installer Qualifications: Company specializing in installing products of the type specified in this section with minimum ten years of documented experience.

#### **1.06 MOCK-UP**

- A. Construct mock-up, 12 feet (3.6 m) long by 12 feet (3.6 m) wide; include panel trim to adjacent materials system, glazing, attachments to building frame, associated air / moisture barrier materials, weep drainage system, sealants and seals, related insulation, and as indicated on drawings and integrated exterior material mock-up requirements specified in Section 014000 in mock-up.
- B. Locate where directed by Architect.
- C. Mock-up may remain as part of the Work.

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

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
- C. Prevent contact with materials that may cause discoloration or staining of products.

#### **1.08 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
- C. Correct defective work within a five year period after Date of Substantial Completion, including defects in water tightness and integrity of seals for metal wall panels.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Basis of Design:
  - 1. Metal Wall / Soffit Panels - Flush-Profile, Concealed Fasteners; Formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels: FW-1025 Panel manufactured by Berridge Manufacturing Company: [www.berridge.com](http://www.berridge.com).
  - 2. Substitutions: See Section 016000-Product Requirements.

#### **2.02 MANUFACTURED METAL PANELS**

- A. Wall / Soffit Panel System: Factory fabricated prefinished metal panel system, site assembled.
  - 1. Vented soffit panels to match. Locate as indicated on drawings.
- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
  - 1. Wind Loads: As indicated on Drawings.
- C. Provide exterior wall panels and subgirt framing assembly.
  - 1. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
  - 2. Design Pressure: In accordance with applicable codes.
    - a. And as indicated on drawings.

3. Maximum Allowable Deflection of Panel:  $L/180$  for length(L) of span.
  4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
  5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
  6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
  7. Corners: Factory-fabricated in one continuous piece with minimum 2 inch (51 mm) returns.
  8. Provide continuity of air / moisture barrier seal at building enclosure elements in accordance with materials specified in Section 072500.
  9. Exterior Wall / Soffit Panels:
    - a. Profile: Vertical; style as indicated.
    - b. Side Seams: Double-interlocked, tight-fitting, sealed with continuous gaskets.
    - c. Material: Precoated steel sheet, 22 gage, 0.0299 inch (0.76 mm) minimum thickness.
    - d. Panel Width: 10.5 nominal coverage inches (260 mm).
    - e. Color: As indicated on drawings.
  10. Subgirt Framing Assembly:
    - a. Provide a thermally broken attachment system for attachment of exterior cladding installed over continuous exterior-insulation.
    - b. 16 gage, 0.0598 inch (1.52 mm) thick formed non-precoated steel sheet.
    - c. Unless more stringent conditions are indicated on drawings.
  11. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.
  12. Expansion Joints: Same material, thickness and finish as exterior sheets; thick; manufacturer's standard brake formed type, of profile to suit system.
  13. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
  14. Anchors: Galvanized steel.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
- E. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

### **2.03 ACCESSORIES**

- A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.
- B. Concealed Sealants: Non-curing butyl sealant or tape sealant.
- C. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
- D. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized. Fastener cap same color as exterior panel.
- E. Field Touch-up Paint: As recommended by panel manufacturer.
- F. Bituminous Paint: Asphalt base.
- G. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

1. Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
  2. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  3. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
- H. Downspouts: Formed from same material and manufacturer's run as wall panels unless indicated otherwise on drawings. Fabricate in 10-foot- long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match wall panels . Furnish supports spaced a maximum of 36 inches on center, fabricated from same metal as downspouts.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that building framing members are ready to receive panels.
- B. Verify that weather barrier has been installed over substrate completely and correctly.

### **3.02 PREPARATION**

- A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at 24 inches on center, maximum (at 610 mm on center, maximum).
  1. Unless more stringent conditions as indicated on drawings.

### **3.03 INSTALLATION**

- A. Install panels on walls in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports.
- E. Lap panel ends minimum 2 inches (51 mm).
- F. Provide expansion and control joints where indicated or where required by manufacturer.
- G. Use concealed fasteners unless otherwise approved by Architect.
- H. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

### **3.04 TOLERANCES**

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch (1.6 mm).
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch (6.4 mm).

### **3.05 CLEANING**

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.
- C. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.
- D. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.
- E. Upon completion of installation, thoroughly clean prefinished aluminum surfaces in accordance with AAMA 609 & 610.

**END OF SECTION 074213**

**SECTION 074213.23**  
**METAL COMPOSITE MATERIAL WALL PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior curtain wall system consisting of formed metal composite material (MCM) sheet, framing, secondary supports, and anchors to structure.
- B. Matching flashing and trim.
- C. Exterior locations are indicated on drawings.

**1.02 DEFINITIONS**

- A. MCM: Metal composite material; cladding material formed by joining two thin metal skins to polyethylene or fire-retardant core and bonded under precise temperature, pressure, and tension.
- B. DBVR: Drained and back-ventilated rainscreen system; rainscreen system designed to drain and dry cavity entering water through drainage channels, weeps, and air ventilation.

**1.03 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Installation of anchors.
- B. Section 042000 - Unit Masonry: Installation of anchors.
- C. Section 054000 - Cold-Formed Metal Framing: Panel support framing.
- D. Section 072500 - Weather Barriers: Weather barrier behind wall panel system.
- E. Section 076200 - Sheet Metal Flashing and Trim: Metal flashing components integrated with this wall system.
- F. Section 079200 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

**1.04 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 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 A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip 2022.
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- H. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- I. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process 2021a.
- J. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- K. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- L. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.

- M. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.
- N. ASTM D1781 - Standard Test Method for Climbing Drum Peel for Adhesives 1998 (Reapproved 2021).
- O. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics 2020.
- P. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- Q. 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).
- R. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2016).
- S. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components 2023.

#### **1.05 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Meeting: Convene one week before starting work of this section to verify project requirements, co-ordinate with installers of other work, establish condition and completeness of building substrate, and review manufacturers' installation instructions and warranty requirements.
  - 1. Require attendance by the installer and relevant sub-contractors.
  - 2. Include MCM sheet manufacturer's representative and wall system manufacturer's representative to review storage and handling procedures.
  - 3. Review in detail truck transportation, parking, vertical transportation, schedule, personnel, installation of adjacent materials and substrate.
  - 4. Review procedures for protection of work and other construction.

#### **1.06 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and 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. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
  - 1. Physical characteristics of components shown on shop drawings.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation instructions and recommendations.
  - 4. Specimen warranty for wall system, as specified herein.
- D. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, number of anchors, supports, reinforcement, trim, flashings, and accessories.
  - 1. Include fabrication and installation layouts of MCM panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
    - a. Indicate panel numbering system.
    - b. Differentiate between shop and field fabrication.
    - c. Indicate substrates and adjacent work with which the wall system must be coordinated.
    - d. Include large-scale details of anchorages and connecting elements.

- e. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing, drainage system, and rainscreen interface at a scale of not less than 1-1/2 inches per 12 inches (1:10).
  - f. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
  - g. Provide project-specific details.
  - h. Do not use architect's drawings as shop drawings.
- E. Selection Samples: For each finish product specified, submit at least three sample color chips representing manufacturer's standard range of available colors and patterns.
  - 1. Sealant Color: Color to match wall panels.
    - a. Unless otherwise indicated.
- F. Verification Samples: For each finish product specified, submit at least three samples, minimum size 12 inch (305 mm) square, and representing actual product in color and texture.
- G. Certificate: Certify that the work results of this section meet or exceed specified requirements.
- H. Design Data: Submit structural calculations stamped by design engineer, for Architect's information and project record.
- I. Product Test Reports: For each product, tests performed by a qualified testing agency.
  - 1. MCM Manufacturer's Material Test Reports: Certified test reports showing compliance with specific performance or third-party listing documenting compliance to comparable code sections IBC 1407.14 and IBC 1703.5.
  - 2. MCM System Fabricator's Certified System Tests Reports: Certified system test reports showing system compliance with specific performance or third-party listing documenting compliance code section. Base performance requirements on MCM system type provided.
    - a. Dry System: Tested to AAMA 501.
    - b. DBVR System: Tested to AAMA 509.
- J. Test Report: Submit report of full-size mock-up tests for air infiltration, water penetration, and wind performance.
- K. Test Report: Submit report of full-size mock-up test for NFPA 285 fire performance.
- L. Manufacturer's Field Reports: Provide within 48 hours of field review. State what was observed and what changes, if any, were requested or required.
- M. Designer's Qualification Statement.
- N. Manufacturer's Qualification Statement.
- O. Installer's Qualification Statement.
- P. Field quality control reports.
- Q. Testing Agency's Qualification Statement.
- R. Maintenance Data: Care of finishes and warranty requirements.
- S. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- T. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

## **1.07 QUALITY ASSURANCE**

- A. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.
- B. Design Engineer's Qualifications: Design structural supports and anchorages under direct supervision of a Structural Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- C. Manufacturer Qualifications: Company specializing in manufacturing wall panel systems specified in this section.



1. With not less than fifteen years of documented experience.
  2. Approved by MCM sheet manufacturer.
  3. Submit contact names and phone numbers for at least three references connected with successful past projects.
- D. Fabricator Qualifications: Approved by Manufacturer.
- E. Installer Qualifications: Company specializing in performing work of the type specified in this section.
1. With minimum fifteen years of documented experience.
    - a. Installer must have completed at least 5 major projects in the specified aluminum composite material panel system.
  2. Approved by wall panel system manufacturer.
  3. Submit contact names and phone numbers for at least three references connected with successful past projects.
- F. Testing Agency Qualifications: Independent agency experienced in testing assemblies of the type required for this project and having the necessary facilities for full-size mock-up testing of the type specified.
- G. Mock-Up: Provide a mock-up for evaluation of fabrication workmanship.
1. Locate where directed.
  2. Provide panels finished as specified.
  3. Mock-up may not remain as part of the Work.

## **1.08 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 weather tight covering installed to provide ventilation.
  3. Store at a slope to ensure positive drainage of any accumulated water.
  4. Do not store in any enclosed space where ambient temperature can exceed 120 degrees F (49 degrees C).
  5. Avoid contact with any other materials that might cause staining, denting, or other surface damage.

## **1.09 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a twenty year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
- C. Installation Warranty for Building Rainscreen Assembly: Installer of exterior rainscreen assembly (including air/vapor barrier and attachments, framing, and exterior panels) to provide 10-year warranty that includes coverage for defective materials and/or workmanship. This warranty will also clearly include materials, labor, necessary activity to access these areas, and removal of any materials to effect repairs and restore to watertight conditions.  
www.edacontractors.com

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

A. Metal Composite Material (MCM) Sheet Manufacturers:  
TPS Memorial Highschool - New  
Facade and Secure Entry  
20210120.01

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Metal Composite Material Wall  
Panels  
10/20/2022

- B. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. 3A Composites USA; Alucobond Plus: [www.3Acompositesusa.com](http://www.3Acompositesusa.com).
  - 2. ALPOLIC Materials; ALPOLIC/fr (Fire Retardant core): [www.alpolic-americas.com](http://www.alpolic-americas.com).
  - 3. Omega-Lite panels manufactured by Laminators Inc.; [www.laminatorsinc.com](http://www.laminatorsinc.com).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- C. Wall Panel System Manufacturers:
- D. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Sobotec; SL2000 Dry Joint System; [www.sobotec.com](http://www.sobotec.com).
    - a. Sobotec Limited – SLT Clip / Rail.
  - 2. Art-form; [www.art-form.com](http://www.art-form.com).
  - 3. Laminators Inc.; [www.laminatorsinc.com](http://www.laminatorsinc.com)
  - 4. Substitutions: See Section 016000 - Product Requirements.

## 2.02 WALL PANEL SYSTEM

- A. Wall Panel System: Metal panels, fasteners, and anchors designed to be supported by framing or other substrate provided by others; provide installed panel system capable of maintaining specified performance without defects, damage or failure.
  - 1. Provide structural design by or under direct supervision of a Structural Engineer licensed in the State in which the Project is located.
  - 2. Provide panel jointing and weatherseal using reveal joints and gaskets but no sealant.
  - 3. Anchor panels to supporting framing without exposed fasteners.
  - 4. No framing component may penetrate the layer of continuous exterior insulation other than thermally isolated fasteners.

## 2.03 PERFORMANCE REQUIREMENTS

- A. Provide tests on full-size mock-ups; tests performed previously for other projects are acceptable provided tested assemblies are truly equivalent to those to be used on this project, unless otherwise indicated.
- B. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus 20 degrees F (minus 29 degrees C) to 180 degrees F (82 degrees C) without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.
- C. Structural Performance: Provide MCM panel systems capable of withstanding the effects of the following loads, based on testing in accordance with ASTM E330:
  - 1. Wind Loads: As indicated on drawings.
    - a. Wind Performance: Provide system tested in accordance with ASTM E330/E330M without permanent deformation or failures of structural members under the following conditions:
    - b. Maximum deflection of perimeter framing member of L/175 normal to plane of the wall; maximum deflection of individual panels of L/60.
    - c. Maximum anchor deflection in any direction of 1/16 inch (1.6 mm) at connection points of framing members to anchors.
- D. Air Leakage: Not more than 0.006 (cfm)/sf of wall area 0.11m<sup>3</sup>/h/m<sup>2</sup>, when tested at 6.24 psf (300 Pa) in accordance with ASTM E283.
- E. Water Penetration: No water penetration under static pressure when tested in accordance with ASTM E331 at a differential of 10 percent of inward acting design load, 14.61 psf (700 kPa) minimum, after 15 minutes.
  - 1. Water penetration is defined as the appearance of uncontrolled water on the interior face of the wall.
  - 2. Design to drain leakage and condensation to the exterior face of the wall.

- F. Fire Performance: Tested in accordance with, and complying with the acceptance criteria of, NFPA 285; testing must be performed specifically for this project.
- G. Building Envelope Performance: Complies with ASHRAE Std 90.1 I-P when tested as part of a building envelope assembly.

## 2.04 PANELS

- A. MCM Wall Panel Systems: Provide factory-formed and -assembled, MCM wall panels fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners and accessories required for weathertight system.
- B. Panels: One inch (2.5 mm) deep pans formed of metal composite material sheet by routing back edges of sheet, removing corners, and folding edges.
  - 1. Reinforce corners with riveted aluminum angles.
  - 2. Provide concealed attachment to supporting structure by adhering attachment members to back of panel; attachment members may also function as stiffeners.
  - 3. Maintain maximum panel bow of 0.8 percent of panel dimension in width and length; provide stiffeners of sufficient size and strength to maintain panel flatness without showing local stresses or read-through on panel face.
  - 4. Reinforce panels over 16 inches (406 mm) long with metal angle braces 24 inches (610 mm) on center in short direction.
    - a. Unless otherwise required by system manufacturer.
  - 5. Secure members to back face of panels using structural silicone sealant approved by MCM sheet manufacturer.
  - 6. Metallic Finished Panels: Maintain consistent grain of MCM sheet; specifically, do not rotate sheet purely to avoid waste.
  - 7. Fabricate panels under controlled shop conditions.
  - 8. Where final dimensions cannot be established by field measurement before commencement of manufacturing, make allowance for field adjustments without requiring field fabrication of panels.
  - 9. Fabricate as indicated on drawings and as recommended by MCM sheet manufacturer.
    - a. Make panel lines, breaks, curves and angles sharp and true.
    - b. Keep plane surfaces free from warp or buckle.
    - c. Keep panel surfaces free of scratches or marks caused during fabrication.
  - 10. Provide joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration on inside face of panel system.
  - 11. For "dry" jointing, secure extrusions to returned pan edges with stainless steel rivets; provide means of concealed drainage with baffles and weeps for water that might accumulate in members of system.

## 2.05 MATERIALS

- A. Metal Composite Material (MCM) Sheet: Two sheets of aluminum sandwiching a core of extruded thermoplastic material; no foamed insulation material content.
  - 1. Overall Sheet Thickness: 0.157 inch (4 mm), minimum.
  - 2. Face Sheet Thickness: 0.019 inches (0.50 mm), minimum.
  - 3. Alloy: Manufacturer's standard, selected for best appearance and finish durability.
  - 4. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 22.4 inch-pound/inch (100 N-mm/mm) with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F (21 degrees C).
  - 5. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
  - 6. Flammability: Self-ignition temperature of 650 degrees F (343 degrees C) or greater, when tested in accordance with ASTM D1929.

- B. Metal Framing Members: Include sub-girts, zee-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation.
  - 1. Provide framing that is thermally broken from building structure.
  - 2. Provide material strength, dimensions, configuration as required to meet the applied loads applied and in compliance with applicable building code.
  - 3. Sheet Steel Components: ASTM A653/A653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60/ZF180; or ASTM A792/A792M aluminum-zinc coated to AZ60/AZM180.
  - 4. Stainless Steel Sheet Components: ASTM A480/A480M.
  - 5. Aluminum Components: ASTM B209 (ASTM B209M); or ASTM B221 (ASTM B221M).
  - 6. Refer to Section 054000 for additional requirements on panel support framing.

## 2.06 FINISHES

- A. Color/Texture: As selected by Architect from manufacturer's full or custom range.

## 2.07 ACCESSORIES

- A. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of MCM panels unless otherwise indicated.
- B. Flashing: Sheet aluminum; 0.040 inch (1.0 mm) thick, minimum; finish and color to match MCM sheet; refer to Section 076200 for additional requirements.
- C. 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. Steel complying with ASTM A36/A36M and hot-dipped galvanized to ASTM A123/A123M Coating Grade 10.
- D. Flashing and Trim: Provide flashing and trim formed from same material as MCM panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent MCM panels.
- E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations or recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
  - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  - 4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
  - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.
- F. Fasteners:

1. Screws: Self-drilling or self-tapping Type 410 stainless steel or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal wall panels.
  2. Bolts: Stainless steel.
  3. Fasteners for Flashing and Trim: Blind fasteners of high-strength aluminum or stainless steel.
- G. Provide panel system manufacturer's and installer's standard corrosion resistant accessories, including fasteners, clips, anchorage devices and attachments.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, MCM panel supports, and other conditions affecting performance of the Work.
  1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by MCM wall panel manufacturer.
  2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by MCM wall panel manufacturer.
- B. Examine dimensions, tolerances, and interfaces with other work.
  1. Verify that weather barrier system is properly installed, refer to Section 072500 for requirements.
- C. Examine substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturers written instructions.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Notify Architect in writing of conditions detrimental to proper and timely completion of work, and do not proceed with erection until unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Protect adjacent work areas and finish surfaces from damage during installation.
- B. Provide anchorage items to be cast into concrete, built into masonry, or as detailed to appropriate installer(s) together with setting templates.
  1. Refer to Section 033000 for additional cast in place concrete requirements.
  2. Refer to Section 042000 for additional unit masonry requirements.

### **3.03 INSTALLATION**

- A. Rainscreen Installation: Install using Fabricator's standard assembly with vertical channel that provides support and secondary drainage assembly, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by manufacturer. Attach metal composite material (MCM) wall panels by inserting horizontal support pins into notches in vertical channels and into flanges of panels. Leave horizontal and vertical joints with open reveal.
- B. DBVR System: Install using Fabricator's standard assembly with vertical channel that provides support and secondary drainage assembly, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by Fabricator. Attach MCM wall panels by inserting horizontal support pins into notches in vertical channels and into flanges of panels. Leave horizontal and vertical joints with open reveal.

- C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, or SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
  - 1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
  - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (605 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).
- D. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.
- E. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.
- F. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.
- G. 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.
- H. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.
- I. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.
- J. Where joints are designed for field applied sealant, seal joints completely with specified sealant.
- K. Install flashings as indicated on shop drawings. At flashing butt joints, provide a lap strap under flashing and seal lapped surfaces with a full bed of non-hardening sealant.
- L. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
  - 1. Variation From Plane or Location: 1/2 inch in 30 feet (10 mm in 10 m) of length and up to 3/4 inch in 300 feet (20 mm in 100 m), maximum.
  - 2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
  - 3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet (3 mm in 9 m) run, maximum.
  - 4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch (0.75 mm), maximum.
- M. 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 10 feet (3 m) under all typical light conditions experienced at the project.

### **3.04 FIELD QUALITY CONTROL**

- A. Wall System Manufacturer's Field Services: Provide field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with instructions.

- B. Site Visits: Schedule two site visits during execution of installation.

### **3.05 CLEANING**

- A. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- B. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.
- C. Remove temporary coverings and protection of adjacent work areas.
- D. Clean installed products in accordance with manufacturer's instructions.

### **3.06 PROTECTION**

- A. Protect installed panel system from damage until Date of Substantial Completion.

**END OF SECTION 074213.23**

**SECTION 075423**  
**THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING - CARLISLE**

**PART 2 PRODUCTS**

**1.01 MANUFACTURER**

- A. Carlisle SynTec Systems: [www.carlisle-syntec.com](http://www.carlisle-syntec.com).
- B. Substitutions: See Section 016000 - Product Requirements.

**1.02 ROOFING APPLICATIONS**

- A. TPO Membrane Roofing: One ply membrane, asphalt adhered, over insulation.
- B. Roofing Assembly Performance Requirements and Design Criteria:

**1.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS**

- A. Membrane:
  - 1. Material: Thermoplastic Polyolefin (TPO) complying with ASTM D6878/D6878M.
  - 2. Products:
- B. Seaming Materials: As recommended by membrane manufacturer.
- C. Flexible Flashing Material: Same material as membrane.
- D. Base Flashing: Provide waterproof, fully adhered base flashing system at all penetrations, plane transitions, and terminations.

**1.04 INSULATION**

**1.05 ACCESSORIES**

- A. Prefabricated Flashing Accessories:
  - 1. Corners and Seams: Same material as membrane, in manufacturer's standard thicknesses.
  - 2. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
  - 3. Sealant Pockets: Same material as membrane, with manufacturer's standard accessories, in manufacturer's standard configuration.
  - 4. Pressure Sensitive Cover Strips: 6 inches (152 mm) wide, 45 mil, 0.045 inch (1.1 mm) thick, non-reinforced TPO membrane laminated to 35 mil, 0.035 inch (0.9 mm) thick cured synthetic rubber with pressure sensitive adhesive.
  - 5. Miscellaneous Flashing: Non-reinforced TPO membrane; 80 mil, 0.080 inch (2.0 mm) thick, in manufacturer's standard lengths and widths.
- B. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
- C. Sealants: As recommended by membrane manufacturer.
  - 1. Product:
- D. Cleaner: Manufacturer's standard, clear, solvent-based cleaner.
  - 1. Product: Carlisle Weathered Membrane Cleaner.
- E. Edgings and Terminations: Manufacturer's standard edge and termination accessories.

**END OF SECTION 075423**



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**SECTION 076200**  
**SHEET METAL FLASHING AND TRIM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts and other items indicated or required for project.
- B. Sealants for joints within sheet metal fabrications.
- C. Precast concrete splash pads.
  - 1. Refer to drawings for locations of concrete slabs at downspouts.

**1.02 RELATED REQUIREMENTS**

- A. Section 061000 - Rough Carpentry: Wood nailers for sheet metal work.
- B. Section 077100 - Roof Specialties: Manufactured copings, flashings, and expansion joint covers.
- C. Section 077123 - Manufactured Gutters and Downspouts.
- D. Section 079200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

**1.03 REFERENCE STANDARDS**

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- 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 2020.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).
- G. CDA A4050 - Copper in Architecture - Handbook current edition.
- H. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
  - 1. Include accessories.
  - 2. Include project-specific details.
  - 3. Show work to be field-fabricated or field-assembled.
  - 4. Show interface with other work.
  - 5. Show all proposed seam and joint locations.
  - 6. Do not use architect's drawings as shop drawings.
  - 7. Scale of shop drawing details not less than 1-1/2" = 1'-0".
  - 8. Show drawings, text and dimensions in black and white at a clear legible scale and size.
  - 9. Color drawings that are not clearly legible will be returned without review.
  - 10. Show Work covered by this section and clarify Work furnished by other sections.
- C. Samples: For each exposed product and for each color and texture specified.

### **1.05 QUALITY ASSURANCE**

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.
- B. Maintain one copy of each document on site.
- C. Fabricator and Installer Qualifications: Company specializing in sheet metal work with ten years of documented experience.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

## **PART 2 PRODUCTS**

### **2.01 SHEET MATERIALS**

- A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) (0.61 mm) thick base metal.
- B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage (0.0239) inch (0.61 mm) thick base metal, shop pre-coated with PVDF coating.
  - 1. Modified Silicone Polyester Coating: Pigmented Organic Coating System, AAMA 2603; baked enamel finish system.
  - 2. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
  - 3. Color: As selected by Architect from manufacturer's standard colors.
    - a. Unless indicated on drawings.
    - b. Existing Sheet Metal Flashing and Trim Repair or Replacement: Match existing, unless otherwise indicated on drawings.
- C. Aluminum: ASTM B209 (ASTM B209M); 20 gage (0.032 inch) (0.81 mm) thick; anodized finish of color as selected.
- D. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 20 gage (0.032 inch) (0.81 mm) thick; plain finish shop pre-coated with fluoropolymer coating.
- E. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 28 gage, (0.0156 inch) (0.40 mm) thick; smooth No. 4 - Brushed finish.

### **2.02 FABRICATION**

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch (13 mm); miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch (450 mm) long legs; seam for rigidity, seal with sealant.
- F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.
- G. Fabricate flashings to allow toe to extend 2 inches (50 mm) over roofing gravel. Return and brake edges.

### **2.03 GUTTER AND DOWNSPOUT FABRICATION**

- A. Gutters: SMACNA (ASMM) Rectangular profile.
  - 1. Unless required to matched existing.
- B. Downspouts: Rectangular profile.
  - 1. Unless required to matched existing.

- 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 3000 psi (21 MPa) at 28 days, with minimum 5 percent air entrainment.
- F. Downspout Boots: Cast iron.
- G. Downspout Extenders: Same material and finish as downspouts.
- H. Seal metal joints.

## **2.04 ACCESSORIES**

- A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers.
- B. Underlayment: Polyethylene, 6 mils (0.15 mm) thick.
- C. Slip Sheet: Rosin sized building paper.
- D. Primer: Zinc chromate type.
- E. Protective Backing Paint: Zinc molybdate alkyd.
- F. Concealed Sealants: Non-curing butyl sealant.
- G. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- H. Plastic Cement: ASTM D4586/D4586M, Type I.
- I. Reglets: Surface mounted type, galvanized steel; face and ends covered with plastic tape.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.
- C. Evaluate existing Sheet Metal Flashing and Trim, including gutters and downspouts, indicated as existing remain. Repair or replace as required for fully functional drainage.

### **3.02 PREPARATION**

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.
- C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

### **3.03 INSTALLATION**

- A. Conform to drawing details.
  - 1. SMACNA (ASMM), Details, as applicable to project.
- B. Secure flashings in place using concealed fasteners.
- C. Apply plastic cement compound between metal flashings and felt flashings.
- D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Seal metal joints watertight.
- F. Secure gutters and downspouts in place with concealed fasteners.
- G. Slope gutters 1/4 inch per 10 feet (2.1 mm per m), minimum.

H. Connect downspouts to downspout boots, and grout connection watertight.

**END OF SECTION 076200**

## **SECTION 077100 ROOF SPECIALTIES**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Manufactured roof specialties, including copings, fascias, gravel stops, and work as indicated on drawings and as required for project not specified elsewhere.
  - 1. Coping profiles and locations are indicated on drawings.
- B. Roof control and expansion joint covers.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 076200 - Sheet Metal Flashing and Trim: Fabricated sheet metal items.
- B. Section 077200 - Roof Accessories: Manufactured curbs and roof hatches.
- C. Section 133419 - Metal Building Systems: Metal framing and accessories as part of Metal Building System.

#### **1.03 REFERENCE STANDARDS**

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.
- B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- C. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- D. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- E. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems 2017.
- F. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).
- G. NRCA (RM) - The NRCA Roofing Manual 2022.
- H. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- C. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
  - 1. Include accessories.
  - 2. Include project-specific details.
  - 3. Show work to be field-fabricated or field-assembled.
  - 4. Show interface with other work.
  - 5. Show all proposed seam and joint locations.
  - 6. Do not use architect's drawings as shop drawings.
  - 7. Scale of shop drawing details not less than 1-1/2" = 1'-0".
  - 8. Show drawings, text and dimensions in black and white at a clear legible scale and size.
  - 9. Color drawings that are not clearly legible will be returned without review.
  - 10. Show Work covered by this section and clarify Work furnished by other sections.
- D. Manufacturer's Installation Instructions: Indicate special procedures, fasteners, supporting members, and perimeter conditions requiring special attention.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following indicated below.
- B. Roof Edge Flashings and Copings:
  - 1. ATAS International, Inc: [www.atas.com](http://www.atas.com).
  - 2. Drexel Metals Inc: [www.drexmet.com](http://www.drexmet.com).
  - 3. Metal-Era Inc: [www.metalera.com](http://www.metalera.com).
  - 4. Metal Roofing Systems, Inc: [www.metalroofingsystems.biz](http://www.metalroofingsystems.biz).
  - 5. OMG Roofing Products: [www.omgroofing.com](http://www.omgroofing.com).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- C. Control and Expansion Joint Covers:
  - 1. Construction Specialties, Inc: [www.c-sgroup.com](http://www.c-sgroup.com).
  - 2. EMSEAL Joint Systems, Ltd: [www.emseal.com](http://www.emseal.com).
  - 3. GAF: [www.gaf.com](http://www.gaf.com).
  - 4. Johns Manville: [www.jm.com](http://www.jm.com).
  - 5. MM Systems Corp: [www.mmsystemscorp.com](http://www.mmsystemscorp.com).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- D. Pipe and Penetration Flashings:
  - 1. Elmdor Stonemen: [www.elmdorstoneman.com](http://www.elmdorstoneman.com).
  - 2. Portals Plus: [www.portalsplus.com](http://www.portalsplus.com).
- E. Counterflashings:
  - 1. ATAS International, Inc: [www.atas.com](http://www.atas.com).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- F. Pipe Penetration Wall Seal:
  - 1. Airex Manufacturing, Inc; Airex Titan Outlet: [www.airexmfg.com/](http://www.airexmfg.com/).
  - 2. Substitutions: See Section 016000 - Product Requirements.
- G. Pipe Penetration Wall Seal and Insulation Protection System:
  - 1. Airex Manufacturing, Inc; Airex Pro-System Kit: [www.airexmfg.com](http://www.airexmfg.com).
  - 2. Substitutions: See Section 016000 - Product Requirements.

### **2.02 COMPONENTS**

- A. Roof Edge Flashings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
  - 1. Configuration: Fascia, cant, and edge securement for roof membrane.
  - 2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test methods RE-1 and RE-2 to positive and negative design wind pressure as defined by applicable local building code.
  - 3. Color: As indicated on drawings.
- B. Copings: Factory fabricated to sizes required; mitered, welded corners; concealed fasteners.
  - 1. Configuration: Concealed continuous hold down cleat at both legs; internal splice piece at joints of same material, thickness and finish as cap; concealed stainless steel fasteners.
  - 2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3 to positive and negative design wind pressure as defined by applicable local building code.
  - 3. Color: As indicated on drawings.
- C. Control and Expansion Joint Covers: Composite construction of 1 inch (25.4 mm) wide flexible EPDM flashing of black color with closed cell urethane foam backing, each edge seamed to aluminum sheet metal flanges, designed for nominal joint width of 1 inch (25.4 mm). Include special formed corners, tees, intersections, and wall flashings, each sealed watertight.

- D. Pipe and Penetration Flashing: Base of galvanized steel, compatible with specified roof systems, and capable of accommodating pipes sized between 3/8 inch (9.5 mm) and 12 inch (305 mm).
  - 1. Caps: EPDM.
  - 2. Color: Manufacturer's standard or Contractor's options where concealed from view.
    - a. Architect to select from Manufacturer's full range of colors where exposed to view.
- E. Roof Penetration Sealing Systems: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
- F. Pipe Penetration Wall Seal: Seal for HVAC piping wall penetrations with wall mounted rigid plastic outlet cover and elastomeric wall seal gasket.
  - 1. Outlet Cover Color: Match color of adjacent finish.
- G. Pipe Penetration Wall Seal and Insulated Piping Protection System: Seal for HVAC piping wall penetrations with wall mounted rigid plastic outlet cover and elastomeric wall seal gasket and having mechanical line insulation with PVC protective cover.
  - 1. Outlet Cover Color: Match color of adjacent finish.
  - 2. PVC Insulation Cover Color: Black with full-length velcro fastener.

### **2.03 FINISHES**

- A. Color Anodized Finish: AAMA 611 AA-M12C22A42/44 Class I integrally or electrolytically colored anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Baked Enamel: Pigmented Organic Coating System, AAMA 2603; polyester baked enamel finish system; color as indicated.
- C. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as indicated.
- D. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as indicated.

### **2.04 ACCESSORIES**

- A. Sealant for Joints in Linear Components: As recommended by component manufacturer.
- B. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.
- C. Roof Cement: ASTM D4586/D4586M, Type I.
  - 1. Unless otherwise required for application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.
  - 1. Refer to Section 077200 for information on roofing related accessories.

### **3.02 INSTALLATION**

- A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Seal joints within components when required by component manufacturer.
- C. Anchor components securely.
- D. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- E. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.
- F. Coordinate installation of flashing flanges into reglets.



**END OF SECTION 077100**

**SECTION 077123  
MANUFACTURED GUTTERS AND DOWNSPOUTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Downspout boots.
- B. Gutters and downspouts not specified elsewhere or included with otherwork.
  - 1. Subject to color and finish requirements indicated on drawings, Contractor may provide formed or manufactured gutters and downspouts for project at Contractor's option.

**1.02 RELATED REQUIREMENTS**

- A. Section 076200 - Sheet Metal Flashing and Trim.
  - 1. Repair and or replacement of existing gutters and downspouts.
  - 2. Splashblocks at roof.

**1.03 REFERENCE STANDARDS**

- A. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.
- B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance 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 2020.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- F. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- G. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Comply with applicable code for size and method of rain water discharge.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on prefabricated components.
- C. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.
  - 1. Include accessories.
  - 2. Include project-specific details.
  - 3. Show work to be field-fabricated or field-assembled.
  - 4. Show interface with other work.
  - 5. Show all proposed seam and joint locations.
  - 6. Do not use architect's drawings as shop drawings.
  - 7. Scale of shop drawing details not less than 1-1/2" = 1'-0".
  - 8. Show drawings, text and dimensions in black and white at a clear legible scale and size.
  - 9. Color drawings that are not clearly legible will be returned without review.
  - 10. Show Work covered by this section and clarify Work furnished by other sections.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.

- B. Prevent contact with materials that could cause discoloration, staining, or damage.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Gutters and Downspouts:
  - 1. ATAS International, Inc: [www.atas.com](http://www.atas.com).
  - 2. Cheney Flashing Company: [www.cheneyflashing.com](http://www.cheneyflashing.com).
  - 3. Drexel Metals Inc: [www.drexmet.com](http://www.drexmet.com).
  - 4. OMG Roofing Products: [www.omgroofing.com](http://www.omgroofing.com).
  - 5. SAF Perimeter Systems, a division of Southern Aluminum Finishing Company, Inc: [www.saf.com/persys](http://www.saf.com/persys).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- C. Scupper and Collectors:
  - 1. Same as or approved by gutter and downspout manufacturer.
    - a. Substitutions: See Section 016000 - Product Requirements.

### **2.02 MATERIALS**

- A. Pre-Finished Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 0.02 inch (0.6 mm) thick base metal.
  - 1. Finish: Shop pre-coated with modified silicone coating.
  - 2. Color: As indicated.
- B. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.032 inch (0.8 mm) thick.
  - 1. Finish: Plain, shop pre-coated with modified silicone coating.
  - 2. Color: As indicated.
- C. Stainless Steel: ASTM A666 Type 304, soft temper, 0.015 inch (0.4 mm) thick; smooth No. 4 finish.
- D. Primer and Solvent for Polyvinyl Chloride (PVC): As recommended by manufacturer.

### **2.03 COMPONENTS**

- A. Gutters: SMACNA square style profile.
- B. Downspouts: SMACNA Square profile.
- C. Anchors and Supports: Profiled to suit gutters and downspouts.
  - 1. Anchoring Devices: In accordance with SMACNA requirements.
  - 2. Gutter Supports: Brackets.
  - 3. Downspout Supports: Brackets.
- D. Fasteners: Same material and finish as gutters and downspouts , with soft neoprene washers.

### **2.04 ACCESSORIES**

- A. Downspout Boots: Cast iron; ASTM A48.
  - 1. Length: 4'-0".
  - 2. Type: As required for application.
    - a. Architect to select from manufacturer's full range. Design intent is to match metal wall panel color.
  - 3. Manufacturers:
    - a. [Downspoutboots.com](http://Downspoutboots.com), a division of J. R. Hoe & Sons; A-Series: [www.downspoutboots.com](http://www.downspoutboots.com).
    - b. Substitutions: See Section 016000 - Product Requirements.

### **2.05 FABRICATION**

- A. Form gutters and downspouts of profiles and sizes indicated.
  - 1. Provide 4" x 4" unless more stringent conditions are indicated on drawings.

- B. Fabricate with required connection pieces.
- C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.
- D. Hem exposed edges of metal. Hem to face inside, concealed from view.
- E. Fabricate gutter and downspout accessories; seal watertight.

## **2.06 FINISHES**

- A. Modified silicone polyester coating: Baked enamel system complying with AAMA 2603.
- B. Fluoropolymer Coating: High Performance Organic Finish, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system; color as selected from manufacturer's standard colors.
  - 1. Design intent is to match adjacent color. Provide custom color if manufacturer cannot provide a close match.
- C. Primer Coat: Finish concealed side of metal sheets with primer compatible with finish system, as recommended by finish system manufacturer.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that surfaces are ready to receive work.

### **3.02 PREPARATION**

- A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil (0.4 mm).

### **3.03 INSTALLATION**

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Sheet Metal: Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts and accessories.
- C. Slope gutters 1/8 inch per foot (3.175 mm/m) .
- D. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

**END OF SECTION 077123**

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**SECTION 079100  
PREFORMED JOINT SEALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Precompressed foam seals.
- B. Compression gaskets.
- C. Preformed strip seals.

**1.02 RELATED REQUIREMENTS**

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Emissions restrictions for joint seal adhesives and primers.
- B. Section 079200 - Joint Sealants: Liquid and mastic joint sealants and their backing materials.

**1.03 REFERENCE STANDARDS**

- A. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber 2020.
- B. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness 2015 (Reapproved 2021).
- C. ASTM D2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements 1991 (Reapproved 2016).

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's technical data sheets for each product, including chemical composition, movement capability, color availability, limitations on application, and installation instructions.
- C. Color Cards: For color selection.
- D. Samples for Color Selection: 4 inch (102 mm) long pieces of each color available; at least 2 samples of each color.
- E. Volatile Organic Content (VOC) Documentation: For adhesives and primers, submit VOC content and emissions documentation as specified in Section 016116.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section with at least five years of documented experience and approved by manufacturer.

**1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a one year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealers that fail to achieve watertight seal or exhibit loss of adhesion or cohesion.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Precompressed Foam Seals:

1. EMSEAL Joint Systems, Ltd: [www.emseal.com](http://www.emseal.com).
  2. Nystrom, Inc: [www.nystrom.com](http://www.nystrom.com).
  3. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com](http://www.tremcosealants.com).
  4. Substitutions: See Section 016000 - Product Requirements.
- C. Compression Gaskets:
1. EMSEAL Joint Systems, Ltd: [www.emseal.com](http://www.emseal.com).
  2. Nystrom, Inc: [www.nystrom.com](http://www.nystrom.com).
  3. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com](http://www.tremcosealants.com).
  - a. Substitutions: See Section 016000 - Product Requirements.
- D. Preformed Strip Seals:
1. EMSEAL Joint Systems, Ltd: [www.emseal.com](http://www.emseal.com).
  2. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com](http://www.tremcosealants.com).
  3. Nystrom, Inc: [www.nystrom.com](http://www.nystrom.com).
  4. Substitutions: See Section 016000 - Product Requirements.

## 2.02 PRECOMPRESSED FOAM SEALS

- A. Precompressed Foam Seal: Comprised of urethane, modified-acrylic impregnated, or open-cell polyurethane foam impregnated with water-repellent, and with self-adhesive faces protected prior to installation by release paper.
1. Color: To match adjacent material color.
    - a. As selected by Architect.
  2. Size as required to provide water-tight seal when installed.
  3. Calculate size according to manufacturer's recommendations.
  4. Measure size of existing joints before selecting seal width.
  5. Applications:
    - a. Exterior wall expansion joints.
    - b. As indicated.
  6. Manufacturers:
    - a. EMSEAL Joint Systems, Ltd: [www.emseal.com](http://www.emseal.com).
    - b. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com](http://www.tremcosealants.com).
    - c. Nystrom, Inc: [www.nystrom.com](http://www.nystrom.com).
    - d. Willseal LLC: [www.willseal.com](http://www.willseal.com).
    - e. Substitutions: See Section 016000 - Product Requirements.

## 2.03 COMPRESSION GASKETS

- A. Compression Gasket: Extruded hollow polychloroprene (neoprene) gasket complying with ASTM D2628; not requiring blockout recess in substrate; not requiring vacuum to collapse seal for installation.
1. Color: Black.
    - a. Unless otherwise indicated.
  2. Durometer Hardness, Type A: Within 55 to 65, when tested in accordance with ASTM D2240.
  3. Size and Shape: As indicated on Drawings.
  4. Calculate size in accordance with manufacturer's recommendations.
  5. Measure size of existing joints before selecting seal width.
  6. Applications:
    - a. Exterior wall expansion joints.
    - b. As indicated.
- B. Compression Gasket: Extruded hollow gasket made of closed cell expanded rubber complying with ASTM D1056, with dense surface skin and serrated sidewalls.
1. Color: Black.
    - a. Unless otherwise indicated.
  2. Durometer Hardness, Type OO: Within 35 to 65, when tested in accordance with ASTM D2240.

3. Size and Shape: As indicated on drawings.
4. Calculate size in accordance with manufacturer's recommendations.
5. Measure size of existing joints before selecting seal width.
6. Adhesive: Epoxy sealant/adhesive recommended by gasket manufacturer.
7. Applications:
  - a. Exterior wall expansion joints.
  - b. As indicated.

## **2.04 PREFORMED STRIP SEALS**

- A. Preformed Strip Seal: Factory formed profile for adhered application to face of joint substrate.
  1. Measure size of existing joints before selecting seal width.
  2. Provide compatible materials for application as recommended by manufacturer.
  3. Applications:
    - a. Exterior wall expansion joints.
    - b. Door and window perimeter joints.
    - c. As indicated.
  4. Manufacturers:
    - a. Dow Chemical Company: [consumer.dow.com/en-us/industry/ind-building-construction.html](http://consumer.dow.com/en-us/industry/ind-building-construction.html).
    - b. EMSEAL Joint Systems, Ltd: [www.emseal.com](http://www.emseal.com).
    - c. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
    - d. Sika Corporation: [www.usa-sika.com](http://www.usa-sika.com).
    - e. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com](http://www.tremcosealants.com).
    - f. Willseal LLC: [www.willseal.com](http://www.willseal.com).
    - g. Substitutions: See Section 016000 - Product Requirements.

## **2.05 ACCESSORIES**

- A. Adhesive: As recommended by seal manufacturer.
- B. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and strip seal.
- C. Substrate Cleaner: Non-corrosive, non-staining type recommended by seal manufacturer; compatible with joint forming materials.
- D. Primer: Type recommended by seal manufacturer to suit application; non-staining.
- E. Backing Tape: Self-adhesive polyethylene tape with surface that seal will not adhere to.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that joints are ready to receive this work.
- B. Measure joint dimensions and verify that seal products are of the correct size to properly seal the joints.

### **3.02 PREPARATION**

- A. Properly prepare construction components adjacent to the work of this section to prevent damage and disfigurement due to this work.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's written instructions.
- B. Precompressed Foam Seals:
  1. Install only when ambient temperature is within recommended application temperature range of adhesive. Consult manufacturer when installing outside this temperature range.
  2. Prepare joints and install seals in accordance with manufacturer's written recommendations.
  3. Remove loose materials and foreign matter that could impair adhesion of sealant.



4. Do not stretch precompressed seal; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch (3 to 6 mm) below adjoining surface.
- C. Compression Gaskets:
1. Install only when ambient temperature is within recommended application temperature range of adhesive. Consult manufacturer when installing outside this temperature range.
  2. Prepare joints and install seals in accordance with manufacturer's written recommendations.
  3. Remove loose materials and foreign matter that could impair adhesion of sealant.
  4. Avoid joints except at ends, corners, and intersections; seal joints with adhesive; install with face 1/8 to 1/4 inch (3 to 6 mm) below adjoining surface.
- D. Preformed Strip Seals:
1. Install when ambient temperature is within recommended application temperature range of adhesive, and consult with manufacturer before installing outside this temperature range.
  2. Prepare joints and install seals in accordance with manufacturer's written recommendations.
  3. Remove loose materials and foreign matter that could impair adhesion.
  4. When installing over existing non-functioning sealant, remove portions of existing installation that protrude beyond surface; install backing tape on surface of existing sealant installation to prevent adhesion of strip seal.

### **3.04 CLEANING**

- A. Clean adjacent soiled surfaces.

### **3.05 PROTECTION**

- A. Protect joints from damage until adhesives have properly cured.

**END OF SECTION 079100**

## **SECTION 079200 JOINT SEALANTS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.
- B. Section 072500 - Weather Barriers: Sealants required in conjunction with Air / Moisture Barriers.
- C. Section 079100 - Preformed Joint Seals: Precompressed foam, gaskets, and strip seals.
- D. Section 092116 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

#### **1.03 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 C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.
- E. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2022.
- F. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- G. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems 2016.
- H. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- I. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2022.
- J. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.
- K. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints 2019 (Reapproved 2020).
- L. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness 2015 (Reapproved 2021).
- M. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension 2016 (Reapproved 2021).
- N. ASTM D695 - Standard Test Method for Compressive Properties of Rigid Plastics 2015.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes 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. Substrates for which laboratory adhesion and/or compatibility testing is required.
  7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
  8. Sample product warranty.
- 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. Joint-Sealant Schedule: Include the following information:
    1. Joint-sealant application, joint location, and designation.
      - a. Include name of adjacent material(s).
    2. Joint-sealant manufacturer and product name.
    3. Joint-sealant formulation.
    4. Joint-sealant color.
    5. Provide drawing(s) or matrix to clearly indicate locations for each type of sealant. Identify sealants as part of this Section and where included in the Work of another Section.
  - G. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation as specified in Section 016116.
  - H. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
  - I. Installation Plan: Submit at least four weeks prior to start of installation.
  - J. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.
  - K. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
  - L. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
  - M. Installation Log: Submit filled out log for each length or instance of sealant installed.
  - N. 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.
  - O. Manufacturer's Qualification Statement.
  - P. Installer's Qualification Statement.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section and with at least five years of documented experience and approved by manufacturer.
- 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. Stain Testing: In accordance with ASTM C1248.

4. Allow sufficient time for testing to avoid delaying the work.
  5. Deliver to manufacturer sufficient samples for testing.
  6. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
  7. 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. Installation Plan: Include schedule of sealed joints, including the following.
1. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgement that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
  2. Installation Log Form: Include the following data fields, with known information filled out.
    - a. Unique identification of each length or instance of sealant installed.
    - b. Location on project.
    - c. Substrates.
    - d. Sealant used.
    - e. Stated movement capability of sealant.
    - f. Primer to be used, or indicate as "No primer" used.
    - g. Size and actual backing material used.
    - h. Date of installation.
    - i. Name of installer.
    - j. Actual joint width; provide space to indicate maximum and minimum width.
    - k. Actual joint depth to face of backing material at centerline of joint.
    - l. Air temperature.
- F. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
1. Identification of testing agency.
  2. Name(s) of sealant manufacturers' field representatives who will be observing
  3. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
    - a. Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.
    - b. Test date.
    - c. Location on project.
    - d. Sealant used.
    - e. Stated movement capability of sealant.
    - f. Test method used.
    - g. Date of installation of field sample to be tested.
    - h. Date of test.
    - i. Copy of test method documents.
    - j. Age of sealant upon date of testing.
    - k. Test results, modeled after the sample form in the test method document.
    - l. Indicate use of photographic record of test.
- G. Field Quality Control Plan:
1. Visual inspection of entire length of sealant joints.
  2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
  3. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.
    - a. For each different sealant and substrate combination, allow for one test every 100 feet (30 meters) in the first 1000 linear feet (305 linear meters), and one test per 1000 linear feet (305 meters) thereafter, or once per floor on each elevation.
    - b. If any failures occur in the first 1000 linear feet (305 linear meters), continue testing at frequency of one test per 500 linear feet (152 linear meters) at no extra cost to Owner.

4. Field testing agency's qualifications.
  5. 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.
- H. 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. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
  5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
  6. 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.
- I. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
1. Record results on Field Quality Control Log.
  2. Repair failed portions of joints.
- J. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
1. Sample: At least 18 inch (457 mm) long.
  2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch (25 mm) by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
  3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.
  4. Record results on Field Quality Control Log.
  5. Repair failed portions of joints.
- K. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or other applicable method as recommended by manufacturer.

## **1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a one year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
  1. Dow Chemical Company: [consumer.dow.com/en-us/industry/ind-building-construction.html](http://consumer.dow.com/en-us/industry/ind-building-construction.html).
  2. Master Builders Solutions by BASF: [www.master-builders-solutions.basf.us/en-us](http://www.master-builders-solutions.basf.us/en-us).
  3. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  4. Sherwin-Williams Company: [www.sherwin-williams.com](http://www.sherwin-williams.com).
  5. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com](http://www.tremcosealants.com).
  6. W.R. Meadows, Inc: [www.wrmeadows.com](http://www.wrmeadows.com).
  7. Substitutions: See Section 016000 - Product Requirements.

- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
1. Dow Chemical Company: [consumer.dow.com/en-us/industry/ind-building-construction.html](http://consumer.dow.com/en-us/industry/ind-building-construction.html).
  2. Master Builders Solutions by BASF: [www.master-builders-solutions.basf.us/en-us/#sle](http://www.master-builders-solutions.basf.us/en-us/#sle).
  3. Pecora Corporation: [www.pecora.com](http://www.pecora.com).
  4. Tremco Commercial Sealants & Waterproofing: [www.tremcosealants.com](http://www.tremcosealants.com).
  5. W.R. Meadows, Inc: [www.wrmeadows.com](http://www.wrmeadows.com).
  6. Substitutions: See Section 016000 - Product Requirements.

## 2.02 JOINT SEALANT APPLICATIONS

- A. Scope: Extent of joint sealants are indicated on drawings.
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, the following items.
    - a. Wall expansion and control joints.
    - b. Joints between door, window, and other frames and adjacent construction.
    - c. Joints between different exposed materials.
    - d. Openings below ledge angles in masonry.
    - e. Other joints indicated below.
  2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
    - a. Joints between door, window, and other frames and adjacent construction.
    - b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
      - 1) Exception: Such gaps and openings in gypsum board finished stud walls and suspended ceilings.
      - 2) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
    - c. Other joints indicated below.
  3. Do not seal the following types of joints.
    - a. Intentional weepholes in masonry.
    - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
    - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
    - d. Joints where installation of sealant is specified in another section.
    - e. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
1. Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.
- C. Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
1. Other Floor Joints: Self-leveling polyurethane "traffic-grade" sealant.

## 2.03 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 016116.
- B. Colors: As indicated on drawings.

## 2.04 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.

2. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
  3. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
  4. Color: Match adjacent finished surfaces.
    - a. Unless otherwise indicated.
- B. 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 25 percent, minimum.
  2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
  3. Color: Match adjacent finished surfaces.
- C. 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: Match adjacent finish, unless otherwise indicated.
- D. Polymer Sealant: ASTM C920; single component, cured sealant is paintable and mold/mildew resistant, low odor and VOC, and ultraviolet (UV) resistant.
1. Color: Match adjacent finish, unless otherwise indicated.
- E. Hybrid Urethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 25 percent, minimum.
  2. Hardness Range: 20 to 40, Shore A, when tested in accordance with ASTM C661.
  3. Color: Match adjacent finished surfaces.
- F. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
1. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
  2. Color: Match adjacent finished surfaces.
- G. Tamper-Resistant Polyurethane Sealant: ASTM C920, Grade NS, Uses M, G, and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 12-1/2 percent, minimum.
  2. Hardness Range: 50 to 60, Shore A, when tested in accordance with ASTM C661.
  3. Color: Match adjacent finished surfaces.
- H. Epoxy Sealant: ASTM C881/C881M, Type I and III, Grade 3, Class B and C; two-component.
1. Hardness Range: 65 to 75, Shore D, when tested in accordance with ASTM C661.
  2. Compressive Strength: 11,000 psi (76 MPa), when tested in accordance with ASTM D695.
  3. Color: Match adjacent finished surfaces.
- I. Acrylic-Urethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; paintable; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 12-1/2 percent, minimum.
  2. Hardness Range: 15 to 40, Shore A, when tested in accordance with ASTM C661.
  3. Color: Match adjacent finish, unless otherwise indicated.
- J. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
1. Color: Match adjacent finish, unless otherwise indicated, Type OP (opaque).
  2. Grade: ASTM C834; Grade Minus 18 Degrees C (0 Degrees F).

## **2.05 SELF-LEVELING SEALANTS**

- A. Self-Leveling Silicone Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent, explicitly approved by manufacturer for traffic exposure when recessed below traffic surface; not expected to withstand continuous water immersion.
1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
  2. Hardness Range: 0 to 15, Shore A, when tested in accordance with ASTM C661.
  3. Color: Gray.
    - a. Unless otherwise indicated.

- B. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
  - 1. Movement Capability: Plus and minus 25 percent, minimum.
  - 2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
  - 3. Color: Gray.
    - a. Unless otherwise indicated.
- C. Self-Leveling Polyurethane Sealant for Horizontal Expansion Joints: ASTM C920, Grade P, Uses T, M and O; multi-component; explicitly approved by manufacturer for horizontal expansion joints.
  - 1. Movement Capability: Plus and minus 25 percent, minimum.
  - 2. Hardness Range: 30 to 35, Shore A, when tested in accordance with ASTM C661.
  - 3. Color: Gray.
    - a. Unless otherwise indicated.
  - 4. Tensile Strength: 200 to 250 psi (1.38 to 1.72 MPa) in accordance with ASTM D412.
- D. Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single or multi-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: Gray.
    - a. Unless otherwise indicated.
- E. Self-Leveling Silyl-Terminated Polyether/Polyurethane (STPE/STPU) Sealant: ASTM C920, Grade P, Uses M and A; single component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion.
  - 1. Movement Capability: Plus and minus 35 percent.
  - 2. Hardness Range: 30 to 55, Shore A, when tested in accordance with ASTM C661.
  - 3. Color: Gray.
    - a. Unless otherwise indicated.
- F. Rigid Self-Leveling Polyurethane Joint Filler: Two part, low viscosity, fast setting; intended for cracks and control joints not subject to significant movement.
  - 1. Hardness Range: Greater than 100, Shore A, and 50 to 80, Shore D, when tested in accordance with ASTM C661.
- G. Flexible Polyurethane Foam: Single-component, gun grade, and low-expanding.
  - 1. Color: White.
    - a. Unless otherwise indicated.
- H. High Quality Latex-Based Sound Sealant: ASTM C834, Type OP an opaque sealant, and Grade 0 Degrees C (32 Degrees F) meets requirements for low-temperature flexibility.
  - 1. Color: White.
    - a. Unless otherwise indicated.
- I. 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: Multi-component, 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: Concrete gray.
  - 4. Joint Width, Minimum: 1/8 inch (3 mm).
  - 5. Joint Width, Maximum: 1/4 inch (6 mm).
- J. Semi-Rigid Self-Leveling Polyurea Joint Filler: Two-component, 100 percent solids; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.



1. Durometer Hardness, Type A: 75, minimum, after seven days when tested in accordance with ASTM D2240.
2. Color: Concrete gray.
3. Joint Width, Minimum: 1/8 inch (3 mm).
4. Joint Width, Maximum: 3/4 inch (19 mm).

## **2.06 ACCESSORIES**

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
  1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
  2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
  3. Open Cell: 40 to 50 percent larger in diameter than joint width.
  4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Overlay Extrusion for Glazing System Joint Protection: Rubber profiled extrusions placed over joints in glazing system and provided with watertight seal.
  1. Profile: As required to match existing metal glazing cap requirements.
  2. Color: As required to match existing conditions.
- C. Preformed Extruded Silicone Joint Seal: Pre-cured low-modulus silicone extrusion, in sizes to fit applications indicated on drawings, combined with a neutral-curing liquid silicone sealant for bonding joint seal to substrates.
  1. Size: 1 inch (25.4 mm) wide, in rolls 100 feet (30.5 m) long.
    - a. Unless otherwise indicated or required.
  2. Thickness: 0.78 inch (19.8 mm), with ridges along outside bottom edges for bonding area.
  3. Color: As selected by Architect.
- D. Preformed Extruded Polyurethane Joint Seal: Medium-modulus, preformed polyurethane extrusion used to bridge joints under elastomeric wall coatings, in sizes to fit applications indicated on drawings, combined with polyurethane sealant for bonding joint seal to substrates.
  1. Size: 1-1/2 inch (38 mm) wide, in rolls 100 feet (30.5 m) long.
    - a. Unless otherwise indicated or required.
  2. Thickness: 0.051 inch (1.3 mm), with ridges along outside bottom edges for bonding area.
  3. Color: Light gray.
    - a. Unless otherwise indicated or required.
- E. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- F. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- G. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- H. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.
- D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
  1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
  2. Notify Architect of date and time that tests will be performed, at least 7 days in advance.

3. Arrange for sealant manufacturer's technical representative to be present during tests.
4. Record each test on Preinstallation Adhesion Test Log as indicated.
5. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
6. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in inconspicuous area to verify that it does not stain or discolor slab.

### **3.03 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform 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.

### **3.04 FIELD QUALITY CONTROL**

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet (30 linear m), notify Architect immediately.
- C. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet (300 linear m), notify Architect immediately.
- D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.
- E. Repair destructive test location damage immediately after evaluation and recording of results.

### **3.05 POST-OCCUPANCY**

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

**END OF SECTION 079200**

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**SECTION 081113  
HOLLOW METAL DOORS AND FRAMES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.
- C. Hollow metal borrowed lites glazing frames.

**1.02 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.

**1.03 ABBREVIATIONS AND ACRONYMS**

- A. ANSI: American National Standards Institute.
- B. ASCE: American Society of Civil Engineers.
- C. HMMA: Hollow Metal Manufacturers Association.
- D. NAAMM: National Association of Architectural Metal Manufacturers.
- E. NFPA: National Fire Protection Association.
- F. SDI: Steel Door Institute.
- G. UL: Underwriters Laboratories.

**1.04 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2018.
- C. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames 2020.
- 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 2020.
- 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 E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- J. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014 (Reapproved 2021).
- K. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames 2016.
- L. FEMA P-361 - Safe Rooms for Tornadoes and Hurricanes: Guidance for Community and Residential Safe Rooms 2021.

- M. FLA (PAD) - Florida Building Code Online - Product Approval Directory Current Edition.
- N. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters 2020.
- O. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- P. ITS (DIR) - Directory of Listed Products Current Edition.
- Q. Miami (APD) - Approved Products Directory; Miami-Dade County Current Edition.
- R. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.
- S. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.
- T. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2017.
- U. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames 2014.
- V. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- W. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives 2022.
- X. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- Y. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames 2019.
- Z. UL 10B - Standard for Fire Tests of Door Assemblies Current Edition, Including All Revisions.
- AA. UL 1784 - Standard for Air Leakage Tests of Door Assemblies Current Edition, Including All Revisions.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
  - 1. Show thermal break frames on Shop Drawings.
  - 2. Include the following for all types:
    - a. Elevations of each door design.
    - b. Details of doors, including vertical and horizontal edge details and metal thicknesses.
    - c. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
    - d. Locations of reinforcement and preparations for hardware.
    - e. Details of anchorages, joints, field splices, and connections.
    - f. Details of accessories.
    - g. Details of moldings, removable stops, and glazing.
    - h. Details of conduit and preparations for power, signal, and control systems.
    - i. Show proposed field splice locations when shipping limitations dictate large openings need to be fabricated in sections.
- D. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- E. Door schedule indicating door and frame location, type, size and swing.
  - 1. Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.
- F. Samples: Submit two samples of metal, 2 inch by 2 inch in size ( 50 mm by 50 mm in size) showing factory finishes, colors, and surface texture.
- G. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

- H. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.
- I. Manufacturer's Qualification Statement.
- J. Installer's Qualification Statement.

## **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: [www.steeldoor.org/sdicertified.php](http://www.steeldoor.org/sdicertified.php).
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least ten years of documented experience.
- C. Maintain at project site copies of reference standards relating to installation of products specified.
- D. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- E. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to UL10C (neutral pressure at 40 inches above sill) or UL 10C.
  - 1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
  - 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
  - 3. Smoke Control Door Assemblies: Comply with NFPA 105.
    - a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.
- F. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.
- G. Energy Efficient Exterior Openings: Comply with minimum thermal ratings, based on ASTM C1363. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.
  - 1. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.37, R-Value 2.7, including insulated door, thermal-break frame and threshold.
  - 2. Unless more stringent requirements are indicated on drawings or required by code.
- H. Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM E283 to meet or exceed the following requirements:
  - 1. Rate of leakage of the door assembly shall not exceed 0.25 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).
  - 2. Unless more stringent requirements are indicated on drawings.
- I. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

## **1.07 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.

1. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.
- C. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- D. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.
  1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

## **1.08 PROJECT CONDITIONS**

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

## **1.09 COORDINATION**

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

## **1.10 WARRANTY**

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

# **PART 2 PRODUCTS**

## **2.01 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
- B. Subject to compliance with requirements, available SDI certified manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. Ceco Door, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  2. Curries, an Assa Abloy Group company: [www.assaabloydss.com](http://www.assaabloydss.com).
  3. Substitutions: See Section 016000 - Product Requirements.

## **2.02 PERFORMANCE REQUIREMENTS**

- A. Requirements for Hollow Metal Doors and Frames:
  1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
  2. Accessibility: Comply with ICC A117.1 and ADA Standards.
  3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
  4. Door Edge Profile: Hinged edge square, and lock edge beveled.
  5. Typical Door Face Sheets: Flush.
  6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Flush, square, low-profile.
    - a. Glazing Stop Fasteners: Pre-finished. Design intent is to match specified frame paint color. Style: Flush.
  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 (galvanized) 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. Hollow Metal Panels: Same construction, performance, and finish as doors.
- C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

### **2.03 HOLLOW METAL 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. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
  - 1. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.
  - 2. Fabricate frames with mitered or coped corners. Profile as indicated on drawings.
- D. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- E. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
- F. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
  - 1. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

### **2.04 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

### **2.05 ACCESSORIES**

- A. Jamb Anchors:
  - 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from A60 metallic coated material, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
  - 2. Stud Wall Type: Designed to engage stud and not less than 0.042 inch thick.
  - 3. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Two anchors per jamb up to 60 inches high.
      - 2) Three anchors per jamb from 60 to 90 inches high.
      - 3) Four anchors per jamb from 90 to 120 inches high.
      - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
    - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
      - 1) Three anchors per jamb up to 60 inches high.
      - 2) Four anchors per jamb from 60 to 90 inches high.
      - 3) Five anchors per jamb from 90 to 96 inches high.
      - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.



- 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.
- B. Floor Anchors: Floor anchors to be provided at each jamb, formed from A60 metallic coated material, not less than 0.042 inches thick. Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
- C. Removable Stops: Formed sheet steel, Flush, low-profile , mitered corners; prepared for countersink style tamper proof screws.
- D. 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 recessed 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, horizontal adjustment option, sealing gasket, snap cover to hide fasteners, and thermal break.
  4. Edge Type: Beveled edge
  5. Material: Manufacturers standard.
  6. Metal Finish: Match door color, powder coat.
  7. Provide non-corroding fasteners at exterior locations.
  8. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
- E. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
- F. Silencers: Resilient rubber or vinyl, 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.
  1. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".
- G. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.
- H. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
  1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
  3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.
- I. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.
  1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.
- D. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

- E. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

### **3.02 PREPARATION**

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.
- B. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- C. Coat inside of other frames with bituminous coating to a thickness of 1/16 inch (1.6 mm).
- D. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- E. Prior to installation, adjust and securely brace welded hollow metal frames for square, level, twist, and plumb condition.
- F. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- G. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

### **3.03 INSTALLATION**

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install prefinished frames after painting and wall finishes are complete.
- C. Install fire rated units in accordance with NFPA 80.
- D. Coordinate frame anchor placement with wall construction.
- E. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
  - 1. Do not grout thermal frames, unless otherwise recommended by manufacturer.
- F. Install door hardware as specified in Section 087100.
  - 1. Comply with recommended practice for hardware placement of doors and frames in accordance with ANSI/SDI A250.6 or NAAMM HMMA 861.
- G. Touch up damaged factory finishes.

### **3.04 TOLERANCES**

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch (1.6 mm) measured with straight edge, corner to corner.

### **3.05 ADJUSTING AND CLEANING**

- A. Adjust for smooth and balanced door movement.
- B. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- C. Remove grout and other bonding material from hollow metal work immediately after installation.
- D. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying, rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

### **3.06 SCHEDULE**

- A. Refer to Door and Frame Schedule on the drawings.

**END OF SECTION 081113**

**SECTION 081416  
FLUSH WOOD DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Flush wood doors; flush and flush glazed configuration; non-rated.

**1.02 RELATED REQUIREMENTS**

- A. Section 081113 - Hollow Metal Doors and Frames.
- B. Section 087100 - Door Hardware.
- C. Section 088000 - Glazing.
- D. Section 099123 - Interior Painting: Field finishing of door trim / glass stops.

**1.03 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
- 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. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- F. WDMA I.S. 1A - Interior Architectural Wood Flush Doors 2021, with Errata.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
  - 1. Include statement of compliance with NAUF (no added urea formaldehyde) requirement.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- D. Door schedule indicating door location, type, size and swing.
  - 1. Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.
    - a. Provide information as required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS)
- E. Samples: Submit two samples of Plastic Laminate door facing, 8 inch by 10 inch in size for each specified color and texture.
- F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.
- G. Manufacturer's Installation Instructions: Indicate special installation instructions.
- H. Manufacturer's Qualification Statement.
- I. Installer's Qualification Statement.
- J. Specimen warranty.
- K. Warranty, executed in Owner's name.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than ten years of documented experience.
  - 1. Company with at least one project within the past 5 years with value of woodwork within 20 percent of cost of woodwork for this project.
  - 2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.

- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than five years of documented experience.
- C. Quality Certification:
  - 1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: [www.awiqcp.org/#sle](http://www.awiqcp.org/#sle).
  - 2. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
  - 3. Provide designated labels on shop drawings as required by certification program.
  - 4. Provide designated labels on installed products as required by certification program.
  - 5. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

#### **1.07 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. High Pressure Decorative Laminate (HPDL) Faced Doors:
  - 1. Ampco Products, Inc: [www.ampco.com](http://www.ampco.com).
  - 2. Oregon Door: [www.oregondoor.com](http://www.oregondoor.com).
  - 3. Poncraft Door Co: [www.poncraft.com](http://www.poncraft.com).
  - 4. VT Industries, Inc: [www.vtindustries.com](http://www.vtindustries.com).
  - 5. Substitutions: See Section 016000 - Product Requirements.
- C. Low Pressure Decorative Laminate (LPDL) Faced Doors:
  - 1. Maiman Company: [www.maiman.com/#sle](http://www.maiman.com/#sle).
  - 2. Marshfield DoorSystems, Inc: [www.marshfelddoors.com](http://www.marshfelddoors.com).
  - 3. Substitutions: See Section 016000 - Product Requirements.

#### **2.02 DOORS**

- A. Doors: Refer to drawings for locations and additional requirements.
  - 1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS), AWMAC/WI (NAAWS) or WDMA I.S. 1A.
  - 2. High Pressure Decorative Laminate (HPDL) Faced Doors: 5-ply unless otherwise indicated.
  - 3. Where plastic laminate (P'Lam) is indicated on door schedule, use either high pressure decorative laminate (HPDL) faced doors in compliance with AWI/AWMAC/WI (AWS), AWMAC/WI (NAAWS) or WDMA I.S. 1A, or low pressure decorative laminate (LPDL) faced doors in compliance with WDMA I.S. 1A.
- B. Interior Doors: 1-3/4 inches (44 mm) thick unless otherwise indicated; flush construction.
  - 1. Provide solid core doors at each location.

2. High pressure decorative laminate (HPDL) finish as indicated on drawings.

### **2.03 DOOR AND PANEL CORES**

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.
  1. Containing NAUF (no added urea formaldehyde).

### **2.04 DOOR FACINGS**

- A. High Pressure Decorative Laminate (HPDL) Facing for Non-Fire-Rated Doors: NEMA LD 3, HGS; color(s) as indicated; textured, low gloss finish.
  1. Containing NAUF (no added urea formaldehyde).
- B. Cross Banding Behind High Pressure Laminate Finish: 1 ply; of HDF material.
- C. Facing Adhesive: Type I - waterproof.

### **2.05 DOOR CONSTRUCTION**

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
  1. Provide solid blocks at lock edge, top of door for closer, and where required for hardware reinforcement.
  2. Provide solid blocking for other throughbolted hardware.
- C. Where supplementary protective edge trim is required, install trim after veneer facing has been applied full-width.
- D. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
- E. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- F. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- G. Provide edge clearances in accordance with the quality standard specified.

### **2.06 ACCESSORIES**

- A. Hollow Metal Door Frames: As specified in Section 081113.
- B. Glazing: As specified in Section 088000.
- C. Glazing Stops: Wood, to match HPDL door facing, mitered corners; prepared for countersink style tamper proof screws.
  1. Flush wood stops.
  2. Concealed fasteners. Provide filler to match stops where required.
  3. Stain wood to match door finish.
- D. Door Hardware: As specified in Section 087100.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

### **3.02 INSTALLATION**

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.

- E. Coordinate installation of glazing.

### **3.03 TOLERANCES**

- A. Comply with specified quality standard for fit and clearance tolerances.
- B. Comply with specified quality standard for telegraphing, warp, and squareness.

### **3.04 ADJUSTING**

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

**END OF SECTION 081416**

**SECTION 083323  
OVERHEAD COILING DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Overhead coiling doors, operating hardware, non-fire-rated; electrically operated.
- B. Wiring from electric circuit disconnect to operator to control station.

**1.02 RELATED REQUIREMENTS**

- A. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- B. Section 083326 - Overhead Coiling Grilles.
- C. Section 087100 - Door Hardware: Cylinder cores and keys.
- D. Division 26 - Electrical: Power, conduit and wiring.
- E. Section 260583 - Wiring Connections: Power to disconnect.

**1.03 REFERENCE STANDARDS**

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- 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. ITS (DIR) - Directory of Listed Products Current Edition.
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- G. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2008 (Reaffirmed 2020).
- H. NEMA MG 1 - Motors and Generators 2021.
- I. UL (DIR) - Online Certifications Directory Current Edition.
- J. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide general construction, electrical equipment, component connections and details, and information related to application.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
  - 1. Show project specific details and interface with adjacent work.
- D. Manufacturer's Installation Instructions: Indicate installation sequence and procedures, adjustment and alignment procedures.
- E. Installer's Qualification Statement.
- F. Maintenance Data: Include lubrication requirements and frequency, periodic adjustments required and other recommendations.
- G. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty years of documented experience.



- B. Installer Qualifications: Company specializing in performing work of type specified and with at least five years documented experience and approved by manufacturer.
- 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.

## **1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Overhead Coiling Doors:
  - 1. Alpine Overhead Doors, Inc: [www.alpinedoors.com/#sle](http://www.alpinedoors.com/#sle).
    - a. Basis-of-Design: IMB-V5.
  - 2. C.H.I. Overhead Doors: [www.chiohd.com/#sle](http://www.chiohd.com/#sle).
  - 3. Clopay Building Products; Model CERD20: [www.clopaydoor.com/#sle](http://www.clopaydoor.com/#sle).
  - 4. Overhaddoor: [www.overhaddoor.com](http://www.overhaddoor.com).
  - 5. Substitutions: See Section 016000 - Product Requirements.

### **2.02 COILING DOORS**

- A. Non-Fire-Rated Interior Coiling Doors: Steel slat curtain.
  - 1. Nominal Slat Size: 2 inches (50 mm) wide by required length.
  - 2. Finish: Factory painted, color as selected.
  - 3. Guides, Angles: Primed steel.
  - 4. Hood Enclosure: Manufacturer's standard; primed steel.
  - 5. Electric operation.
  - 6. Mounting: Surface mounted.
  - 7. Insulation and Weather Striping: Manufacturer's standard.
    - a. Required for acoustical control.

### **2.03 MATERIALS AND COMPONENTS**

- A. Metal Curtain Construction: Interlocking slats.
  - 1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
  - 2. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
  - 3. Weatherstripping for Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of all doors.
  - 4. Steel Slats: Minimum thickness, 22 gauge; ASTM A653/A653M galvanized steel sheet.
- B. Sliding Door Construction: Manufacturer's standard insulated panels for door type and model selected.
  - 1. Perimeter Seals: Manufacturer's standard flexible and abrasion-resistant polyurethane extrusions.
- C. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- D. Guides - Angle: ASTM A36/A36M metal angles, size as indicated.
  - 1. Prime paint.
- E. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.
  - 1. Prime paint.
- F. Lock Hardware:
  - 1. Cylindrical Locking Mechanism: Latchset lock cylinder, specified in Section 087100.
  - 2. For motor operated units, additional lock or latching mechanisms are not required.

### **2.04 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.
  - 2. Provide tamperproof operation cycle counter.
- 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: 1 HP (750 W); continuous duty.
    - a. Unless otherwise indicated on electrical drawings or required
  - 4. Motor Voltage: 120 volts, single phase, 60 Hz.
    - a. Unless otherwise indicated on electrical drawings or required for application.
  - 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 (300 mm/sec).
  - 8. Brake: Manufacturer's standard type, activated by motor controller.
  - 9. Manual override in case of power failure.
  - 10. Refer to Section 260583 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**

### **3.01 EXAMINATION**

- A. Verify that opening sizes, tolerances and conditions are acceptable.

### **3.02 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 with Section 260583.
- F. Complete wiring from disconnect to unit components.
- G. Install enclosure and perimeter trim.

### **3.03 TOLERANCES**

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch (1.6 mm).
- C. Maximum Variation From Level: 1/16 inch (1.6 mm).
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet (3.2 mm per 3 m) straight edge.

### **3.04 ADJUSTING**

- A. Adjust operating assemblies for smooth and noiseless operation.

### **3.05 CLEANING**

- A. Clean installed components.
- B. Remove labels and visible markings.

**END OF SECTION 083323**

**SECTION 083326  
OVERHEAD COILING GRILLES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Overhead coiling metal grilles and operating hardware; electrically operated.

**1.02 RELATED REQUIREMENTS**

- A. Section 087100 - Door Hardware: Cylinder cores and keys.
- B. Division 26: Wiring and Power.

**1.03 REFERENCE STANDARDS**

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.
- C. ITS (DIR) - Directory of Listed Products Current Edition.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2008 (Reaffirmed 2020).
- F. NEMA MG 1 - Motors and Generators 2021.
- G. UL (DIR) - Online Certifications Directory Current Edition.
- H. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide general construction component connections and details, and electrical equipment.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
- D. Manufacturer's Installation Instructions: Indicate installation sequences and procedures, adjustment and alignment procedures.
- E. Manufacturer's Qualification Statement.
- F. Installer's Qualification Statement.
- G. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least five 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.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Overhead Coiling Grilles:
  - 1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Overhead Door Corp; Upward Coiling Security Grille 670: [www.overheaddoor.com](http://www.overheaddoor.com)
3. Alpine Overhead Doors, Inc; Mall-Dawn: [www.alpinedoors.com/#sle](http://www.alpinedoors.com/#sle).
4. C.H.I. Overhead Doors; 9300 Lift Ready Series: [www.chiohd.com/#sle](http://www.chiohd.com/#sle).
5. Substitutions: See Section 016000 - Product Requirements.

## **2.02 GRILLES AND COMPONENTS**

- A. Grille: Aluminum; horizontal bar curtain, coiling on overhead counterbalanced shaft.
  1. Finish: Anodized, Clear color.
  2. Lock Devices: Lock and latch handle on outside.
  3. Electric operation.
  4. Mounting: As indicated on drawings.
- B. Curtain: Round horizontal bars connected with vertical links.
  1. Horizontal bars: 5/16 inch (8 mm) diameter.
  2. Bar spacing: 1-1/2 inch (38 mm) on center.
  3. Tube spacers: 1/2 inch (13 mm) diameter.
  4. Spacer spacing: 3-1/4 inch (83 mm) on center.
  5. Link spacing: 6 inch (152 mm) on center.
  6. Bar Ends: Provide with nylon runners for quiet operation.
  7. Bottom Bar: Back-to-back angles with tubular resilient cushion.
- C. Guides: Extruded aluminum angles, of profile to retain grille in place with snap-on trim, mounting brackets of same metal.
- D. Hood Enclosure and Trim: Sheet metal; completely covering operating mechanisms; internally reinforced to maintain rigidity and shape.
  1. Material: Same metal as grille.
- E. Lock Hardware:
  1. Latchset Lock Cylinders: Standard mortise cylinder.
    - a. Keying: Master keyed.
  2. For motor operated units, additional lock or latching mechanisms are not required.
  3. Latch Handle: Manufacturer's standard.
- 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 (10 kg) nominal force to operate.

## **2.03 MATERIALS**

- A. Aluminum: ASTM B221 (ASTM B221M).

## **2.04 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.
  2. Provide tamperproof operation cycle counter.
- B. Electric Operators:
  1. Mounting: Side mounted.
  2. Motor Enclosure:
    - a. Interior Coiling Grilles: NEMA MG 1, Type 1; open drip proof.
  3. Motor Rating: As recommended by manufacturer; continuous duty.
  4. Motor Voltage: 120 volts, single phase, 60 Hz.
  5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
  6. Controller Enclosure: NEMA 250 Type 1.
  7. Opening Speed: 12 inches per second (300 mm/s).
  8. Brake: Adjustable friction clutch type, activated by motor controller.
  9. Manual override in case of power failure.
  10. Refer to 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 grill, full width, electro-mechanical sensitized type, wired to stop and reverse grill direction upon striking object, hollow neoprene covered.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that opening sizes, tolerances and conditions are acceptable.

#### **3.02 INSTALLATION**

- A. Install grille unit assembly 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.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Coordinate installation of electrical service with requirements indicated on drawings.
- F. Complete wiring from disconnect to unit components.
- G. Install enclosure and perimeter trim.

#### **3.03 TOLERANCES**

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch (1.5 mm).
- C. Maximum Variation From Level: 1/16 inch (1.5 mm).
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft (3 mm per 3 m) straight edge.

#### **3.04 ADJUSTING**

- A. Adjust grille, hardware and operating assemblies for smooth and noiseless operation.

#### **3.05 CLEANING**

- A. Clean grille and components.
- B. Remove labels and visible markings.

**END OF SECTION 083326**

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**SECTION 084313**  
**ALUMINUM-FRAMED STOREFRONTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aluminum-framed storefront, with vision glass.
- B. Infill panels of metal and glass.
- C. Aluminum doors and frames.
- D. Weatherstripping.

**1.02 RELATED REQUIREMENTS**

- A. Section 051200 - Structural Steel Framing: Steel attachment members.
- B. Section 055000 - Metal Fabrications: Steel attachment devices.
- C. Section 072500 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.
- D. Section 079200 - Joint Sealants: Sealing joints between frames and adjacent construction.
- E. Section 084413 - Glazed Aluminum Curtain Walls.
- F. Section 087100 - Door Hardware: Hardware items other than specified in this section.
- G. Section 088000 - Glazing: Glass and glazing accessories.
- H. Division 12 - Window Shades: Attachments to framing members.

**1.03 REFERENCE STANDARDS**

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site 2015.
- B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems 2015.
- C. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems 2014.
- D. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document) 2015.
- E. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2020.
- F. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections 2009.
- G. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- I. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- J. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- L. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.
- M. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2004 (Reapproved 2012).
- N. 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).



- O. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2016).
- P. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors 2002 (Reapproved 2018).
- Q. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference 2015.
- R. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

#### **1.04 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.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
  - 1. VOC Content: For sealants used inside of the weatherproofing system, include printed statement of VOC content.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
  - 1. Show connection to and continuity with adjacent thermal, weather, and air barriers.
  - 2. Include point-to-point wiring diagrams.
  - 3. Include design engineer's stamp or seal on shop drawings for attachments and anchors.
  - 4. Include details of conduit and preparations for power, signal, and control systems.
  - 5. Include glass manufacturer's documentation of review and approval of glass application and installation configuration.
  - 6. Include sealant color on shop drawings for each location.
  - 7. Include flashing and drip ledge colors, where exposed to view.
  - 8. Provide sealant manufacturer's documentation of review and approval of structural and typical sealant joint sizing and application. Provide sealant manufacturer's report of material compatibility and adhesion.
  - 9. Use same frame designations and naming as indicated on drawings.
- D. Manufacturer's Installation Instructions: Provide installation instructions specific to the components and conditions on this project. Provide manufacture's re-glaze instructions.
- E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- G. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- H. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.
- I. Designer's Qualification Statement.
- J. Manufacturer's Qualification Statement.
- K. Installer's Qualification Statement.
- L. Engineer's Qualification Statement.
- M. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

## **1.06 QUALITY ASSURANCE**

- A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least twenty years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of type specified and with at least ten years of documented experience and approved by manufacturer.
- D. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.
- E. Product Options: Drawings indicate size, profiles, and dimensional requirements of aluminum framed storefront system and are based on the specific system indicated. Do not modify size and dimensional requirements.
- F. Design Criteria: Drawings indicate sizes, spacing of members, profiles and dimensional requirements of entrance and storefront work. Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Minor deviations will be acceptable in order to utilize manufacturer's standard products when such deviations do not materially detract from the design concept of intended performances.
  - 1. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
  - 2. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's written review and acceptance.
- G. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
- H. Pre-installation Conference: Approximately two weeks prior to scheduled commencement of storefront installation, meet at project site with Installer, installers of substrate construction to receive work, installers of other work in and around storefront work which must precede, follow or interact with storefront work, Contractor and storefront manufacturer's representative. Review methods and procedures related to work.

## **1.07 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.

## **1.08 FIELD CONDITIONS**

- A. Do not install sealants when ambient temperature is less than 40 degrees F (5 degrees C). Maintain this minimum temperature during and 48 hours after installation.

## **1.09 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

## **PART 2 PRODUCTS**

### **2.01 SOURCE LIMITATION**

- A. Obtain aluminum-framed entrances from a single source or producer.

### **2.02 SYSTEM REQUIREMENTS**

TPS Memorial Highschool - New

Facade and Secure Entry

20210120.01

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Aluminum-Framed Storefronts

10/20/2022

- A. Design Requirements:
1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
  2. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
  3. Provide concealed fastening.
  4. Provide entrance systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
  5. Attachment considerations are to take into account project peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
  6. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
  7. Provide framed systems to fit within openings provided without the use of excessive sealant joints.

### **2.03 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING**

- A. Front-Set Style, Thermally-Broken:
1. Kawneer:
    - a. Trifab Versaglaze 450.
    - b. Trifab 451T.
  2. Oldcastle Building Envelope:
    - a. Series 3000 Thermal MultiPlane.
    - b. Series 6000 Thermal MultiPlane.
  3. Interior locations to match exterior frame profiles and sight lines. Thermally-Broken frames not required at interior locations.
  4. SSG / 2-sided glazing locations are indicated on drawings. Provide frame type as required for application.
- B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:
1. Manko Window Systems Inc.; [www.mankowindows.com](http://www.mankowindows.com).
    - a. Manko 2450FS.
    - b. Manko 2600xpt.
- C. Substitutions: See Section 016000 - Product Requirements.
1. For any product not identified, submit information as specified for substitutions.

### **2.04 BASIS OF DESIGN -- SWINGING DOORS**

- A. Wide Stile, Insulating Glazing, Thermally-Broken:
1. Thermally-Broken doors are required at all exterior locations.
    - a. Kawneer.
      - 1) 500T Insulpour Thermal Entrance.
    - b. Oldcastle Building Envelope.
      - 1) WS-500 TC Thermal Composite Door and Frame.
    - c. Interior locations to match exterior door style and configuration. Thermally-Broken frames not required at interior locations.
- B. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of another manufacturer. another manufacturer.
1. Manko Window Systems Inc.; [www.mankowindows.com](http://www.mankowindows.com).
    - a. Manko 150xpt.
- C. Substitutions: See Section 016000 - Product Requirements.
1. For any product not identified , submit information as specified for substitutions.

### **2.05 ALUMINUM-FRAMED STOREFRONT**

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
  1. Unitized, shop assembly.
    - a. 1 inch insulated glazing at exterior locations.
  2. Glazing Rabbet: For 1/4 inch (6 mm) monolithic glazing.
    - a. At interior locations.
      - 1) Unless otherwise indicated.
  3. Finish: Class I color anodized.
    - a. Factory finish all surfaces that will be exposed in completed assemblies.
    - b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
  4. Finish Color: Black.
  5. 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.
  6. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
  7. 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.
  8. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F (95 degrees C) over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
  9. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
  10. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
    - a. Excessive sealant joints are not allowed.
  11. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
  12. Preparation for Window Treatments: Provide reinforced interior horizontal head rail.
    - a. Where required for window shades.
- B. Performance Requirements:
  1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
    - a. Design Wind Loads: As indicated on drawings.
    - b. Other Design Loads: As indicated on drawings.
    - c. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
  2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 10 psf (480 Pa).
  3. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft (0.3 L/sec sq m) of wall area, when tested in accordance with ASTM E283 at 6.27 psf (300 Pa) pressure differential across assembly.
  4. Condensation Resistance Factor of Framing: 60, minimum, measured in accordance with AAMA 1503.
  5. Overall Maximum U-Value Including Glazing. Comply with IECC 2018, Table C402.4, Climate Zone 3:
    - a. Fixed Fenestration: U-0.46 Maximum.
    - b. Operable Fenestration: U-0.60 Maximum.
    - c. Entrance Doors: U-0.77 Maximum.

- d. Unless more stringent conditions are required by local AHJ or specified elsewhere.
- 6. Sub-sill: Full height sub-sill, to match specified mullion sight line. Partial height sub-sills are not allowed.
  - a. Anchoring through the back of the sub-sill is not allowed.

## **2.06 COMPONENTS**

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
  - 1. Framing members for interior applications need not be thermally broken.
  - 2. Glazing Stops: Flush.
  - 3. Cross-Section: As indicated on drawings.
  - 4. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.
    - a. Provide reinforcing as required for application.
- B. Glazing: As specified in Section 088000.
- C. Infill Panels: Insulated, aluminum sheet face and back, with edges formed to fit glazing channel and sealed.
  - 1. Core: Rigid polyisocyanurate foam insulation core with LTTR-Value of 5 per inch, minimum.
  - 2. Provide additional infill insulation where indicated on drawings.
  - 3. Finish: Same as storefront.
    - a. Smooth finish. Textured panels are not allowed.
- D. Swing Doors: Glazed aluminum.
  - 1. Thickness: 2-1/4 inches (57.1 mm).
    - a. Exterior Thermal Doors.
  - 2. Thickness: 2 inches (50 mm).
    - a. Interior Doors.
  - 3. Top Rail: 4 inches (100 mm) wide, minimum.
    - a. Provide 8 inch top rail where door closer exceeds manufacturer's standard top rail. Seams are allowed.
  - 4. Vertical Stiles: 4 inches (100 mm) wide, minimum.
  - 5. Bottom Rail: 12 inches (304 mm) wide.
    - a. One-piece, seamless.
  - 6. Glazing Stops: Extruded Aluminum; Square.
  - 7. Finish: Same as storefront.
  - 8. Door Jambs: Tubular.
  - 9. Frames: Fabricate with mechanical joints using internal steel reinforcing plates, shear blocked and fastened as recommended by manufacturer for application.
    - a. Spline Screws: #10, minimum.
      - 1) Unless more stringent sizes are recommended by manufacturer for application.

## **2.07 SHOP FABRICATE TO THE GREATEST EXTENT POSSIBLE; DISASSEMBLE IF NECESSARY FOR SHIPPING.**

## **2.08 MATERIALS**

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Sheet Aluminum: ASTM B209 (ASTM B209M).
- C. Structural Steel Sections: ASTM A36/A36M; galvanized in accordance with requirements of ASTM A123/A123M.
- D. Structural Supporting Anchors: See Section 051200.
- E. Structural Supporting Anchors Attached to Structural Steel: Design for welded attachment.
- F. Fasteners: Stainless steel.

- G. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch (0.81 mm) minimum thickness; finish to match framing members.
  - 1. Material thickness shall be as required, suitable to condition, without deflection or "oil-canning".
- H. Concealed Flashings: Galvanized steel, 26 gage, 0.0179 inch (0.45 mm) minimum base metal thickness.
- I. Concealed Flashings: Stainless steel, 26 gage, 0.0187 inch (0.48 mm) minimum thickness.
- J. Concealed Flashings: Sheet aluminum, 26 gage, 0.017 inch (0.43 mm) minimum thickness.
- K. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.
- L. Sealant for Setting Thresholds: Non-curing butyl type.
- M. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- N. Glazing Accessories: As specified in Section 088000.
- O. Shop and Touch-Up Primer for Steel Components: Zinc oxide, alkyd, linseed oil primer appropriate for use over hand cleaned steel.
- P. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

## **2.09 FINISHES**

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils (0.018 mm) thick.
- B. Color: Dark bronze.
- C. Touch-Up Materials: As recommended by coating manufacturer for field application.

## **2.10 HARDWARE**

- A. For each door, include weatherstripping, sill sweep strip, threshold, and as indicated or required for project.
- B. Other Door Hardware: As specified in Section 087100.
- C. Weatherstripping: Wool pile, continuous and replaceable; provide on all doors.
- D. Sill Sweep Strips: Resilient seal type, retracting, of neoprene; provide on all doors.
- E. Threshold: Extruded aluminum, one piece per door opening, non-slip surface; provide on all exterior doors and where required by floor finish transitions.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

### **3.02 INSTALLATION**

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

- H. Provide SPF insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in continuous bed of sealant and secure.
- J. Install glass and infill panels in accordance with Section 088000, using glazing method required to achieve performance criteria.
- K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

### **3.03 TOLERANCES**

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet (1.5 mm per m) non-cumulative or 0.06 inch per 10 feet (1.5 mm per 3 m), whichever is less.
  - 1. Unless more stringent conditions are recommended by manufacturer for application.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).

### **3.04 FIELD QUALITY CONTROL**

- A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.
- B. See Section 014000 - Quality Requirements, for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.
- C. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
  - 1. Perform a minimum of three tests in each designated area as directed by Architect.
  - 2. Conduct tests in each area prior to 10 percent, 35 percent, 50 percent, and 70 percent completion of this work.
    - a. Unless otherwise recommended by manufacturer for project.
- D. Provide field testing of installed storefront system by AAMA accredited independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
  - 1. Perform a minimum of three tests in each designated area as indicated on drawings.
  - 2. Conduct tests in each area prior to 35 percent, 50 percent, and 70 percent completion of this work.
    - a. Unless otherwise recommended by manufacturer for project.
  - 3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 4.18 psf (200 Pa).
    - a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce (14 gram) that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.
  - 4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 6.20 psf (300 Pa).
- E. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.

### **3.05 ADJUSTING**

- A. Adjust operating hardware for smooth operation.

### **3.06 CLEANING**

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.
- C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

### **3.07 PROTECTION**

A. Protect installed products from damage until Date of Substantial Completion.

**END OF SECTION 084313**



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## **SECTION 088000 GLAZING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Insulating glass units.
- B. Glazing units.
  - 1. Clear Glass
- C. Locations and glazing types are indicated on drawings.
- D. Glazing compounds and accessories.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 079200 - Joint Sealants: Sealants for other than glazing purposes.
- B. Section 084313 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.
- C. Section 088300 - Mirrors.

#### **1.03 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015 (Reaffirmed 2020).
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2019).
- E. ASTM C1036 - Standard Specification for Flat Glass 2021.
- F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- G. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass 2019.
- H. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass 2021a.
- J. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2020.
- K. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings 2016.
- L. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes 2020.
- M. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation 2019.
- N. ASTM F1233 - Standard Test Method for Security Glazing Materials And Systems 2021.
- O. GANA (GM) - GANA Glazing Manual 2008.
- P. GANA (SM) - GANA Sealant Manual 2008.
- Q. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- R. NFRC 100 - Procedure for Determining Fenestration Product U-factors 2020.
- S. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence 2020.

- T. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems 2020.
- U. 2018 International Energy Conservation Code (IECC).

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

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

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on drawings.
- E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Initial Samples: Submit two samples 12 by 12 inch (305 by 305 mm) in size of glass units.
  - 1. For each type of clear glass specified.
- G. Certificate: Certify that products of this section meet or exceed specified requirements.
- H. Manufacturer's Qualification Statement.
- I. Installer's Qualification Statement.
- J. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- K. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
- L. See Section 016000 - Product Requirements, for additional provisions.
- M. Extra Insulating Glass Units: One of each glass size and each glass type.

#### **1.06 QUALITY ASSURANCE**

- A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM) and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty years of documented 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. Safety Glazing Certification Council (SGCC).
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least ten years documented experience.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- E. Provide fully tempered and / or safety glazing at locations as required by code.

#### **1.07 MOCK-UPS**

- A. See Section 014000 - Quality Requirements, for additional mock-up requirements.
- B. Provide on-site glazing mock-up with the specified glazing components.
- C. Locate where directed.

- D. Clear glass Mock-ups may remain as part of the Work.
- E. Ceramic Frit Glass Mock-up: For each type of pattern indicated or requested by Architect after initial sample review:
  - 1. Provide 7-foot by 7-foot minimum Mock-up of ceramic frit glass.
  - 2. Ceramic frit glass Mock-up may not remain as part of the Work.
  - 3. Architect's review of mock-up will determine ceramic frit glass pattern for project.

## **1.08 FIELD CONDITIONS**

- A. Do not install glazing when ambient temperature is less than 40 degrees F (4 degrees C).
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

## **1.09 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.
- C. Laminated Glass: Provide a ten (10) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.
- D. Heat Soaked Tempered Glass: Provide a ten (10) year manufacturer warranty to include coverage for spontaneous breakage of fully tempered glass caused by nickel sulfide (NiS) inclusions.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Float Glass Manufacturers:
  - 1. Basis-of-design: Vitro Architectural Glass (formerly PPG Glass): [www.vitroglazings.com](http://www.vitroglazings.com).
    - a. Solarban 90.
  - 2. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Viracon: [www.viracon.com](http://www.viracon.com).
      - 1) VNE1-53.
    - b. GGI - Saint Gobain: [www.saint-gobain-glass.com](http://www.saint-gobain-glass.com).
      - 1) Cool-Lite Xtreme.
  - 3. Substitutions: Refer to Section 016000 - Product Requirements.
    - a. For any product not identified, submit information as specified for substitutions.
- B.

### **2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES**

- A. Comply with 2018 International Energy Conservation Code (IECC), unless more stringent conditions are indicated.
- B. 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. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7
  - 4. 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.
  - 5. Glass thicknesses listed are minimum.
- C. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.

1. In conjunction with vapor retarder and joint sealer materials described in other sections.
  2. To utilize the inner pane of multiple pane insulating glass units for the continuity of the vapor retarder and air barrier seal.
  3. To maintain a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.
- D. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  3. Solar Optical Properties: Comply with NFRC 300 test method.

## **2.03 GLASS MATERIALS**

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
1. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
    - a. Provide heat strengthened glass at all locations, except where tempered / safety glass is indicated or required for safety based on application or as required by code.
    - b. Maximum peak to valley rollerwave 0.005" (0.127mm) in the central area.
  2. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
    - a. Provide as required for application and as required by code.
    - b. Maximum peak to valley rollerwave 0.005" (0.127mm) in the central area.
  3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
    - a. Provide as required for application and as required by code, whether or not shown on drawings. It is the Contractor's responsibility to confirm and provide safety glass as required by code.
  4. Heat-Soak Testing (HST): Provide HST of fully tempered glass used on canopy, point-supported, spider wall, high-risk, sloping overhead, horizontal overhead, free-standing glass protective barrier, or other demanding applications of project, to reduce risks of spontaneous breakage due to nickel sulfide (NiS) induced fractures in accordance with industry established testing requirements.
  5. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.
  2. Provide as required for application and as required by code.

## **2.04 INSULATING GLASS UNITS**

- A. Manufacturers:
1. Any of the manufacturers specified for float glass.
- B. 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.
7. Capillary Tubes: Provide tubes from air space for insulating glass units without inert type gas that have a change of altitude greater than 2500 feet (762 m) between point of fabrication and point of installation to permit pressure equalization of air space.
  - a. Capillary Tubes: Tubes to remain open and be of length and material type in accordance with insulating glass fabricator's requirements.
  - b. Inert gas may be installed in the field into air space in accordance with insulating glass fabricator's and installer's requirements.
- C. Type GL-1 - Insulating Glass Units: High Performance Laminated Glass.
  1. Applications:
    - a. Locations indicated on drawings.
  2. Space between lites filled with air.
  3. Glass Type: fully tempered float glass for both outboard and inboard lites.
  4. Tint: Solarban 90 (2) Clear + Sentry Guard.
  5. Total Thickness: 1 inch (25.4 mm).
  6. Thermal Transmittance (U-Value), Summer - Center of Glass: [\_\_\_\_], nominal.

## 2.05 GLAZING UNITS

- A. Type GL-2 - Monolithic Interior Vision Glazing:
  1. Applications: Interior glazing unless otherwise indicated.
  2. Glass Type: Fully tempered float glass.
  3. Tint: Clear.
  4. Thickness: 1/4 inch (6.4 mm), nominal.

## 2.06 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot (25 mm for each square meter) of glazing or minimum 4 inch (100 mm) by width of glazing rabbet space minus 1/16 inch (1.5 mm) by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Continuous by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
  1. Width: As required for application.
  2. Thickness: As required for application.
  3. Spacer Rod Diameter: As required for application.
- D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option I; color black.
- E. Glazing Clips: Manufacturer's standard type.
- F. Smoke Removal Window/Glazing Unit Markings: Adhesive backed markings affixed to manually operable or fixed windows of high-rise buildings to identify units intended for post-fire smoke removal in compliance with ICC (IBC) and local building officials.

## 2.07 SOURCE QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Provide shop inspection and testing for glass.

## PART 3 EXECUTION

### 3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that 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.

### **3.02 PREPARATION**

- A. Clean contact surfaces with appropriate solvent and wipe dry immediately before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

### **3.03 INSTALLATION, GENERAL**

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

### **3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)**

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

### **3.05 INSTALLATION - DRY GLAZING METHOD (TAPE AND GASKET SPLINE GLAZING)**

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- F. Carefully trim protruding tape with knife.

### **3.06 INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)**

- A. Application - Interior Glazed: Set glazing infills from the interior of the building.
- B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.

- C. Place setting blocks at 1/4 points with edge block no more than 6 inch (152 mm) from corners.
- D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- E. Place glazing tape on free perimeter of glazing in same manner described above.
- F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- G. Carefully trim protruding tape with knife.

### **3.07 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- C. Monitor and report installation procedures and unacceptable conditions.

### **3.08 CLEANING**

- A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.
- B. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- C. Remove non-permanent labels immediately after glazing installation is complete.
- D. Clean glass and adjacent surfaces after sealants are fully cured.
- E. 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.

### **3.09 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 088000**



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**SECTION 090561  
COMMON WORK RESULTS FOR FLOORING PREPARATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
  - 1. Resilient tile and sheet.
  - 2. Carpet tile.
  - 3. Thin-set tile.
  - 4. Wood athletic flooring.
  - 5. Finishes that require preparation not specified in other sections.
- B. Removal of existing floor coverings.
  - 1. Where applicable.
- C. Preparation of new and existing concrete floor slabs for installation of floor coverings.
- D. Testing of concrete floor slabs for moisture and alkalinity (pH).
- E. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
  - 1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.
- F. Patching compound.
- G. Remedial floor coatings.
- H. Remedial floor sheet membrane.

**1.02 RELATED REQUIREMENTS**

- A. Section 014000 - Quality Requirements: Additional requirements relating to testing agencies and testing.
- B. Section 017419 - Construction Waste Management and Disposal: Handling of existing floor coverings removed.
- C. Section 033000 - Cast-in-Place Concrete: Moisture emission reducing curing and sealing compound for slabs to receive adhered flooring, to prevent moisture content-related flooring failures; to remain in place, not to be removed.
- D. Section 033000 - Cast-in-Place Concrete: Limitations on curing requirements for new concrete floor slabs.
- E. Section 096566 – Resilient Athletic Flooring: Concrete slab moisture and alkalinity testing.

**1.03 REFERENCE STANDARDS**

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens) 2021.
- B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete 2020.
- C. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2021.
- D. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride 2022.
- E. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes 2019a.
- F. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings 2011.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

#### **1.05 SUBMITTALS**

- A. Visual Observation Report: For existing floor coverings to be removed.
- B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
  - 1. Moisture and alkalinity (pH) limits and test methods.
  - 2. Manufacturer's required bond/compatibility test procedure.
- C. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
  - 1. Manufacturer's qualification statement.
  - 2. Manufacturer's statement of compatibility with types of flooring applied over remedial product.
  - 3. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.
  - 4. Manufacturer's installation instructions.
  - 5. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.
- D. Testing Agency's Report:
  - 1. Description of areas tested; include floor plans and photographs if helpful.
  - 2. Summary of conditions encountered.
  - 3. Moisture and alkalinity (pH) test reports.
  - 4. Copies of specified test methods.
  - 5. Recommendations for remediation of unsatisfactory surfaces.
  - 6. Product data for recommended remedial coating.
  - 7. Include certification of accuracy by authorized official of testing agency.
  - 8. Submit report to Architect.
  - 9. Submit report not more than two business days after conclusion of testing.
- E. Adhesive Bond and Compatibility Test Report.
- F. Floor Moisture Testing Technician Certificate: International Concrete Repair Institute (ICRI) Concrete Slab Moisture Testing Technician- Grade I certificate.
- G. Copy of RFCI (RWP).

#### **1.06 QUALITY ASSURANCE**

- A. Moisture and alkalinity (pH) testing shall be performed by an independent testing agency employed and paid by Contractor.
- B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
  - 1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.
- C. Contractor's Responsibility Relating to Independent Agency Testing:
  - 1. Provide access for and cooperate with testing agency.
  - 2. Confirm date of start of testing at least 10 days prior to actual start.
  - 3. Allow at least 4 business days on site for testing agency activities.
  - 4. Achieve and maintain specified ambient conditions.
  - 5. Notify Owner when specified ambient conditions have been achieved and when testing will start.

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

- A. Deliver, store, handle, and protect products in accordance with manufacturer's instructions and recommendations.
- B. Deliver materials in manufacturer's packaging; include installation instructions.

- C. Keep materials from freezing.

## **1.08 FIELD CONDITIONS**

- A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F (18 degrees C) or more than 85 degrees F (30 degrees C).
- B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
  - 1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.
  - 2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
- B. Alternate Flooring Adhesive: Floor covering manufacturer's recommended product, suitable for the moisture and pH conditions present; low-VOC. In the absence of any recommendation from flooring manufacturer, provide a product recommended by adhesive manufacturer as suitable for substrate and floor covering and for conditions present.
- C. Remedial Floor Coating: Single- or multi-layer coating or coating/overlay combination intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
  - 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
  - 2. Use product recommended by testing agency.
- D. Remedial Floor Sheet Membrane: Pre-formed multi-ply sheet membrane installed over concrete subfloor and intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
  - 1. Thickness: As required for application and in accordance with manufacturer's installation instructions.
  - 2. Tape: Types recommended by underlayment manufacturer to install membrane and cover seams.

## **PART 3 EXECUTION**

### **3.01 CONCRETE SLAB PREPARATION**

- A. Follow recommendations of testing agency.
- B. Perform following operations in the order indicated:
  - 1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
    - a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
    - b. Removal of existing floor covering.
  - 2. Existing concrete slabs with coatings or penetrating sealers/hardeners/dustproofers:
    - a. Do not attempt to remove coating or penetrating material.
    - b. Do not abrade surface.
  - 3. Preliminary cleaning.

4. Moisture vapor emission tests; 3 tests in the first 1000 square feet (100 square meters) and one test in each additional 1000 square feet (100 square meters), unless otherwise indicated or required by flooring manufacturer.
  5. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
  6. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
  7. Specified remediation, if required.
  8. Patching, smoothing, and leveling, as required.
  9. Other preparation specified.
  10. Adhesive bond and compatibility test.
  11. Protection.
- C. Remediations:
1. Active Water Leaks or Continuing Moisture Migration to Surface of Slab: Correct this condition before doing any other remediation; re-test after correction.
  2. Excessive Moisture Emission or Relative Humidity: If an adhesive that is resistant to the level of moisture present is available and acceptable to flooring manufacturer, use that adhesive for installation of the flooring; if not, apply remedial floor coating or remedial sheet membrane over entire suspect floor area.
  3. Excessive Alkalinity (pH): If remedial floor coating is necessary to address excessive moisture, no additional remediation is required; if not, if an adhesive that is resistant to the level present is available and acceptable to the flooring manufacturer, use that adhesive for installation of the flooring; otherwise, apply a skim coat of specified patching compound over entire suspect floor area.

### **3.02 REMOVAL OF EXISTING FLOOR COVERINGS**

- A. Comply with local, State, and federal regulations and recommendations of RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to floor covering being removed.
- B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

### **3.03 PRELIMINARY CLEANING**

- A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.
- B. Do not use solvents or other chemicals for cleaning.

### **3.04 MOISTURE VAPOR EMISSION TESTING**

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F1869 and as follows.
- D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet (1.4 kg per 93 square meters) per 24 hours.
- F. Report: Report the information required by the test method.

### **3.05 INTERNAL RELATIVE HUMIDITY TESTING**

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

- B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.
- C. Test in accordance with ASTM F2170 Procedure A and as follows.
- D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.
- E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.
- F. Report: Report the information required by the test method.

### **3.06 ALKALINITY TESTING**

- A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.
- B. The following procedure is the equivalent of that described in ASTM F710, repeated here for the Contractor's convenience.
  - 1. Use a wide range alkalinity (pH) test paper, its associated chart, and distilled or deionized water.
  - 2. Place several drops of water on a clean surface of concrete, forming a puddle approximately 1 inch (25 mm) in diameter. Allow the puddle to set for approximately 60 seconds, then dip the alkalinity (pH) test paper into the water, remove it, and compare immediately to chart to determine alkalinity (pH) reading.
  - 3. Use of a digital pH meter with probe is acceptable; follow meter manufacturer's instructions.
- C. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

### **3.07 PREPARATION**

- A. See individual floor covering section(s) for additional requirements.
- B. Comply with recommendations of testing agency.
- C. Comply with requirements and recommendations of floor covering manufacturer.
- D. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.
- E. Do not fill expansion joints, isolation joints, or other moving joints.

### **3.08 ADHESIVE BOND AND COMPATIBILITY TESTING**

- A. Comply with requirements and recommendations of floor covering manufacturer.

### **3.09 APPLICATION OF REMEDIAL FLOOR COATING**

- A. Comply with requirements and recommendations of coating manufacturer.

### **3.10 INSTALLATION OF REMEDIAL FLOOR SHEET MEMBRANE**

- A. Install in accordance with sheet membrane manufacturer's instructions.

### **3.11 PROTECTION**

- A. Cover prepared floors with building paper or other durable covering.

**END OF SECTION 090561**

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**SECTION 092116  
GYPSUM BOARD ASSEMBLIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Resilient sound isolation clips.
- E. Acoustic insulation.
- F. Gypsum sheathing.
- G. Cementitious backing board.
- H. Gypsum wallboard.
- I. Joint treatment and accessories.
- J. Textured finish system.
- K. Acoustic (sound-dampening) wall and ceiling board.

**1.02 RELATED REQUIREMENTS**

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 054000 - Cold-Formed Metal Framing: Structural steel stud framing.
- C. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.
- D. Section 072100 - Thermal Insulation: Acoustic insulation.
- E. Section 072500 - Weather Barriers: Water-resistive barrier over sheathing.
- F. Section 078400 - Firestopping: Top-of-wall assemblies at fire rated walls.
- G. Section 079200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.
- H. Section 313116 - Termite Control: Field-applied termiticide and mildewcide for metal framing.

**1.03 REFERENCE STANDARDS**

- A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units 2018.
- B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units 2019.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- E. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members 2015.
- F. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017 (Reapproved 2022).
- G. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members 2018.
- 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 C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base 2019.
- L. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing 2017.
- M. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel 2018.
- N. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel 2017.
- O. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing 2018.
- P. ASTM C1288 - Standard Specification for Fiber-Cement Interior Substrate Sheets 2017.
- Q. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units 2022.
- R. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.
- S. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels 2019, with Editorial Revision (2020).
- T. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2021.
- U. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- V. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).
- W. ASTM E413 - Classification for Rating Sound Insulation 2022.
- X. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).
- Y. GA-216 - Application and Finishing of Gypsum Panel Products 2021.
- Z. GA-600 - Fire Resistance and Sound Control Design Manual 2021.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate special details associated with fireproofing, acoustic seals, and control joints, cove lighting and interface with specialty casework and finish carpentry.
  - 1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
  - 2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.
  - 3. Show locations for each type of gypsum board on shop drawings.
  - 4. Include corner guard detail.
- C. Product Data: Provide data on metal framing, gypsum board, glass mat faced gypsum board, accessories, joint finishing system, and tile backer panels.
- D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- E. Manufacturer's installation instructions.
- F. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.
- G. Installer's Qualification Statement.

#### **1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum ten years of documented experience.

#### **1.06 MOCK-UP**

- A. Provide mock-up of stud wall, ceiling, and soffit framing including insulation, sheathing, window frame, and door frame and finish specified in other sections. Coordinate with installation of associated Work specified in other sections.
- B. Provide mock-up of gypsum board corner trim.
- C. Mock-up may remain as part of the Work.

### **PART 2 PRODUCTS**

#### **2.01 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
  - 1. See PART 3 for finishing requirements.

#### **2.02 METAL FRAMING MATERIALS**

- A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Manufacturers - Metal Framing, Connectors, and Accessories:
    - a. ClarkDietrich: [www.clarkdietrich.com](http://www.clarkdietrich.com).
    - b. Jaimes Industries: [www.jaimesind.com](http://www.jaimesind.com).
    - c. Marino: [www.marinoware.com](http://www.marinoware.com).
    - d. R-stud, LLC: [www.rstud.com](http://www.rstud.com).
    - e. Phillips Manufacturing Co: [www.phillipsmfg.com](http://www.phillipsmfg.com).
    - f. SCAFCO Corporation: [www.scafco.com](http://www.scafco.com).
    - g. Substitutions: See Section 016000 - Product Requirements.
- B. Structural Steel Framing for Application of Gypsum Board: As specified in Section 054000.
- C. Non-structural Framing System Components: ASTM C645; 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/360 at 5 psf (L/360 at 240 Pa).
  - 1. Studs: "C" shaped with flat or formed webs with knurled faces.
  - 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 (22 mm).
  - 5. Resilient Furring Channels: Single or double leg configuration; 1/2 inch (12 mm) channel depth.
    - a. Unless other sizes are required for applications indicated on drawings.
  - 6. Resilient Sound Isolation Clips: Steel resilient clips with molded rubber isolators, attaches to framing; improves noise isolation performance of wall and floor-ceiling assemblies.
- D. Shaft Wall Studs and Accessories: ASTM C645; 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.
- E. Area Separation Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with specified performance requirements.
- 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.
  - 1. Unless more stringent conditions are indicated on drawings.
- G. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.
- H. Preformed Top Track Firestop Seal:

1. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
- I. Flute Cover: 20 gauge corrugated strap for horizontal use to span fluted areas of metal decks.
  1. Basis-of-Design: Clark Dietrich Flute Cover (FC).
- J. Non-structural Framing Accessories:
  1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
  2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
    - a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
  3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
- K. Grid Suspension Systems: Steel grid system of main tees and support bars connected to structure using hanging wire.

## 2.03 BOARD MATERIALS

- A. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. Manufacturers - Gypsum-Based Board:
    - a. American Gypsum Company: [www.americangypsum.com](http://www.americangypsum.com).
    - b. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
    - c. Continental Building Products: [www.continental-bp.com](http://www.continental-bp.com).
    - d. Georgia-Pacific Gypsum: [www.gpgypsum.com](http://www.gpgypsum.com).
    - e. National Gypsum Company: [www.nationalgypsum.com](http://www.nationalgypsum.com).
    - f. PABCO Gypsum: [www.pabco gypsum.com](http://www.pabco gypsum.com).
    - g. USG Corporation: [www.usg.com](http://www.usg.com).
    - h. 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, unless otherwise indicated.
  2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
  3. Unfaced fiber-reinforced gypsum panels as defined in ASTM C1278/C1278M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
  4. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
    - a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
    - b. Mold resistant board is required:
      - 1) Toilet Rooms.
      - 2) Utility or mechanical rooms.
      - 3) Laundry rooms.
      - 4) Kitchens.
      - 5) Janitor / Custodian rooms.
  5. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
  6. Thickness:
    - a. Vertical Surfaces: 5/8 inch (16 mm).
      - 1) Unless otherwise indicated for direct adhesion over CMU.
    - b. Horizontal Surfaces: 5/8 inch (16 mm).
    - c. Ceilings: 1/2 inch (13 mm).
    - d. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
- C. Backing Board For Wet Areas: One of the following products:

1. Application: Surfaces behind tile in wet areas including tub and shower surrounds, shower ceilings, and within 10 feet of any plumbing fixture.
  2. Application: Horizontal surfaces behind tile in wet areas including countertops and within 10 feet of any plumbing fixture.
  3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  4. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
    - a. Thickness: 1/2 inch (12.7 mm) unless otherwise indicated.
  5. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
    - a. Thickness: 1/2 inch (12.7 mm).
  6. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
    - a. Regular Type: Thickness 1/2 inch (12.7 mm).
    - b. Fire Resistant Type: Type X core, thickness 5/8 inch (16 mm).
- D. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
1. Application: Vertical surfaces behind thinset tile, except in wet areas.
  2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  3. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
  4. Type: Regular and Type X, in locations indicated.
  5. Type X Thickness: 5/8 inch (16 mm).
  6. Type C Thickness: 1/2 inch (13 mm).
  7. Regular Board Thickness: 1/2 inch (13 mm).
  8. Edges: Tapered.
- E. 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: 1/2 inch (13 mm).
  3. Edges: Tapered.
- F. Acoustical Sound Dampening Wall and Ceiling Board: Two layers of heavy paper faced, high density gypsum board separated by a viscoelastic polymer layer and capable of achieving STC rating of 50 or more in typical stud wall assemblies as calculated in accordance with ASTM E413 and when tested in accordance with ASTM E90.
1. Thickness: 1/2 inch (13 mm).
  2. Long Edges: Tapered.
  3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
- G. 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. Interior edge of parapet walls: Sheathing type recommended by roof manufacturer.
  6. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
  7. Core Type: Type X.
  8. Type X Thickness: 5/8 inch (16 mm).
  9. Regular Board Thickness: 5/8 inch (16 mm).
  10. Edges: Square.
  11. Glass Mat Faced Products:

- a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - b. American Gypsum Company; M-Glass Exterior Sheathing Type X.
  - c. American Gypsum Company; M-Glass Exterior Sheathing.
  - d. Georgia-Pacific Gypsum; DensGlass Sheathing.
  - e. Georgia-Pacific Gypsum; DensGlass Fireguard Sheathing.
  - f. National Gypsum Company; Gold Bond eXP Sheathing.
  - g. Substitutions: See Section 016000 - Product Requirements.
- H. Shaftwall and Coreboard: Type X; 1 inch (25 mm) thick by 24 inches (610 mm) wide, beveled long edges, ends square cut.
  - 1. Paper-Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
  - 2. Glass Mat Faced Type: Glass mat shaftliner gypsum panel or glass mat coreboard gypsum panel as defined in ASTM C1658/C1658M.
  - 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
  - 4. Paper-Faced Products:
    - a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) American Gypsum Company; M-Bloc Shaft Liner.
      - 2) American Gypsum Company; Shaft Liner.
      - 3) CertainTeed Corporation; M2Tech Type X Shaftliner.
      - 4) Georgia-Pacific Gypsum; ToughRock Shaftliner.
      - 5) National Gypsum Company; Gold Bond Fire-Shield Shaftliner XP.
      - 6) Substitutions: See Section 016000 - Product Requirements.
  - 5. Glass Mat Faced Products:
    - a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) American Gypsum Company; M-Glass Shaft Liner.
      - 2) CertainTeed Corporation; GlasRoc Shaftliner Type X.
      - 3) Continental Building Products; Shaftliner Type X.
      - 4) Continental Building Products; Mold Defense Shaftliner Type X.
      - 5) Continental Building Products; Weather Defense Platinum Shaftliner Type X.
      - 6) Georgia-Pacific Gypsum; DensGlass Shaftliner (mold-resistant).
      - 7) National Gypsum Company; Gold Bond Brand eXP Shaftliner.
      - 8) National Gypsum Company; Gold Bond Fire-Shield Shaftliner XP.
      - 9) Substitutions: See Section 016000 - Product Requirements.

## **2.04 GYPSUM WALLBOARD ACCESSORIES**

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced.
  - 1. Thickness:
    - a. 3-1/2" at 3-5/8" studs.
    - b. 5-1/2" at 6" studs.
    - c. Unless more stringent requirements are indicated on drawings.
- B. Sound Isolation Tape: Elastomeric foam tape for sound decoupling.
  - 1. Surface Burning Characteristics: Provide assemblies with flame spread index of 75 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
  - 2. Tape Thickness: 1/4 inch (6 mm).
- C. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- D. Water-Resistive Barrier: As specified in Section 072500.
- E. Beads, Joint Accessories, and Other Trim: ASTM C1047, galvanized steel, rolled zinc, or extruded aluminum, unless noted otherwise.

1. Corner Trim: Low profile, for 90 degree outside corners.
    - a. Products:
      - 1) Fry Reglet DMCT-1250: [www.fryreglet.com](http://www.fryreglet.com).
        - (a) Locations: All outside corners, full height of wall from finish floor to at least 2" above finish ceiling so that trim edge is fully concealed by ceiling finish.
          - (1) Where tile is indicated: Do not install at tile or above tile, where tile is up to 5'-0" above finish floor.
        - (b) Finish: Manufacturer's standard paint-grip finish. Paint to match adjacent wall.
          - (1) Unless otherwise indicated on drawings.
      - 2) Substitutions: See Section 016000 - Product Requirements.
  2. L-Trim with Tear-Away Strip: Sized to fit 1/2 inch (13 mm) or 5/8" thick gypsum wallboard.
  3. Architectural Reveal Beads:
    - a. Shapes: As indicated on drawings.
  4. Wall Mounted Deflection Beads: Flexible gasket and bead with 1-1/8 inch (29 mm) flange.
    - a. Unless more stringent deflection requirements are indicated on drawings.
  5. Expansion Joints:
    - a. Type: V-shaped metal with factory-installed protective tape.
      - 1) Unless otherwise indicated on drawings.
    - b. Products:
    - c. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Phillips Manufacturing Co; 093 Expansion Control Joint: [www.phillipsmfg.com](http://www.phillipsmfg.com).
      - 2) Substitutions: See Section 016000 - Product Requirements.
- F. Decorative Metal Trim:
1. Material: Extruded aluminum alloy 6063-T5 temper.
  2. Finish: Factory primed for field painting, unless otherwise indicated.
  3. Type: Profile as selected from manufacturer's standard range, unless otherwise indicated.
- G. Moisture Guard Trim: ASTM C1047, rigid plastic, 48 inch (1219.2 mm) length, applied to bottom edge of gypsum board.
1. Height: 1-3/4 inch (44.5 mm).
  2. Depth: 5/8 inch (15.9 mm) or as required for application.
  3. Locations:
    - a. Walls adjacent to wet areas not scheduled to receive tile.
    - b. Utility or mechanical rooms.
    - c. Laundry rooms.
    - d. Kitchens.
    - e. Janitor / Custodian rooms.
  4. Products:
    - a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - b. Watertguard USA; Watertguard: [www.watertguard-usa.com](http://www.watertguard-usa.com).
    - c. Substitutions: See Section 016000 - Product Requirements.
- H. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

### **3.02 SHAFT WALL INSTALLATION**

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches (600 mm) on center.

2. Install studs at spacing required to meet performance requirements.
- B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.
  1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.

### **3.03 FRAMING INSTALLATION**

- A. Metal Framing: Install in accordance with ASTM C754 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.
  3. Install bracing as required at exterior locations to resist wind uplift.
- C. Studs: Space studs as indicated.
  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. Acoustic Furring: Install resilient channels at maximum 24 inches (600 mm) on center. Locate joints over framing members.
- F. Resilient Sound Isolation Clips: Install resilient sound isolation clips, and where applicable, associated furring sections and channels, in accordance with clip manufacturer's written instructions.
- G. Furring for Fire Ratings: Install as required for fire resistance ratings indicated and to GA-600 requirements.
- H. Blocking: Install mechanically fastened steel sheet 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.
  7. Equipment as indicated and as required
  8. Other items as required for project
  9. Provide channel blocking where required for application.

### **3.04 ACOUSTIC ACCESSORIES INSTALLATION**

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.
- C. Acoustic Sealant: Install in accordance with manufacturer's instructions.

### **3.05 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 Non-Rated: 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 Non-Rated: 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-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.
  - 2. Paper-Faced Sheathing: Immediately after installation, protect from weather by application of water-resistive barrier.
- G. Exterior Soffits: Install exterior soffit board perpendicular to framing, with staggered end joints over framing members or other solid backing.
  - 1. Seal joints, cut edges, and holes with water resistant sealant.
- H. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.
- I. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

### **3.06 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 (10 meters) apart on walls and ceilings over 50 feet (16 meters) long.
  - 2. Align wall and ceiling control joints.
  - 3. At one side of window and / or door openings or at 30 feet maximum spacing.
  - 4. At dissimilar materials.
  - 5. Contractor shall coordinate control joint locations with Architect in walls exceeding 30 feet in length and ceilings exceeding 50 feet.
  - 6. Contractor shall coordinate control joint locations with Architect in walls with wall covering or graphics.
  - 7. Refer to additional information as indicated on drawings.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.
- D. Decorative Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.
- E. Moisture Guard Trim: Install on bottom edge of gypsum board according to manufacturer's instructions and in locations indicated on drawings.

### **3.07 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 paper 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 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  - 2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  - 3. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
  - 4. Level 0: Temporary partitions.



- 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 (0.8 mm).
- E. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

### **3.08 TEXTURE FINISH**

- A. Texture finishes are not allowed.

### **3.09 TOLERANCES**

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet (3 mm in 3 m) in any direction.

**END OF SECTION 092116**

**SECTION 092400  
CEMENT PLASTERING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Cement plastering.
  - 1. Exterior Stucco.

**1.02 RELATED REQUIREMENTS**

- A. Section 054000 - Cold-Formed Metal Framing: Structural metal framing for plaster.
- B. Section 072500 - Weather Barriers.
- C. Section 099113 - Exterior Painting.

**1.03 REFERENCE STANDARDS**

- A. ASTM C91/C91M - Standard Specification for Masonry Cement 2018.
- B. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- C. ASTM C206 - Standard Specification for Finishing Hydrated Lime 2014 (Reapproved 2022).
- D. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes 2018.
- E. ASTM C897 - Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters 2015 (Reapproved 2020).
- F. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster 2022a.
- G. ASTM C932 - Standard Specification for Surface-Applied Bonding Compounds for Exterior Plastering 2006 (Reapproved 2019).
- H. ASTM C1328/C1328M - Standard Specification for Plastic (Stucco) Cement 2019.
- I. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2020.
- J. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL (DIR) - Online Certifications Directory Current Edition.
- L. UL (FRD) - Fire Resistance Directory Current Edition.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide data on plaster materials and trim accessories.
  - 1. Manufacturer's specifications, details, installation instructions and product data.
  - 2. Fastener manufacturer's pull-out or withdrawal capacity testing for frame and solid substrates.
- C. Shop Drawings: Indicate wall joint patterns, joint details, and molding profiles.
  - 1. Include details of entire assembly. Prepare and submit project-specific details.
- D. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements.
- E. Evaluation Service Reports: Show compliance with specified requirements.
- F. Samples:
  - 1. Submit two samples, 12 by 12 inch (305 by 305 mm) in size illustrating finish color and texture.
  - 2. Submit two samples of each type trim accessory.
- G. Installer's Qualification Statement.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum ten years documented experience.
  - 1. Employ skilled mechanics who are experienced and knowledgeable in portland cement stucco application, and familiar with the requirements of the specified work.
  - 2. Installer to provide testing in accordance with manufacturer's specifications.
- B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

#### **1.06 MOCK-UP**

- A. Mock-Up Panel: Construct a 4 foot wide by 8 foot high (1200 mm wide by 2400 mm high) sample panel of plaster work at the jobsite demonstrating installation procedures, finish texture, and color. Show each phase of installation including framing and reinforcement.
- B. Construct mock-up of exterior wall, 12 feet (3657 m) long by 12 feet (3657 m) wide, illustrating surface finish and adjacent materials and window.
  - 1. Locate where directed.
  - 2. Mock-up may remain as part of this work.

#### **1.07 FIELD CONDITIONS**

- A. Exterior Plaster Work: Do not apply plaster when substrate or ambient air temperature is 40 degrees F (4 degrees C) or lower, or when temperature is expected to drop below 40 degrees F (4 degrees C) within 48 hours of application.
  - 1. Provide supplementary heat for installation in temperatures less than 40°F (4°C) such that material temperatures are maintained as required by manufacturer. Prevent concentration of heat on uncured stucco and vent fumes and other products of combustion to the outside to prevent contact with stucco.
  - 2. Prevent uneven or excessive evaporation of moisture from stucco during hot, dry or windy weather. For installation under any of these conditions provide special measures to properly moist cure the stucco. Do not install stucco if ambient temperatures are expected to rise above 100°F (38°C) within a 24 hour period.
- B. Maintain ambient and surface temperatures above 40°F (4°C) during application and for 24 hours after set of stucco, and after application of air/moisture barrier and finish materials.

### **PART 2 PRODUCTS**

#### **2.01 CEMENT PLASTER APPLICATIONS**

#### **2.02 FACTORY PREPARED CEMENT PLASTER**

- A. Exterior Portland cement plaster system made of scratch and brown base coat and flexible acrylic finish coat; install in accordance with ASTM C926.
  - 1. Provide continuous exterior insulation as part of the system, furnished or approved by same manufacturer.
    - a. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578, with natural skin surfaces.
    - b. Provide weather resistive barrier as part of the system, furnished or approved by same manufacturer.
      - 1) Fluid-applied air and moisture barrier membrane.
      - 2) Vapor Permeable.
      - 3) Water Vapor Transmission: ASTM E96, > 10 perms.
      - 4) Material Air Leakage Resistance, ASTM E 2178: less than 0.02 L/s·m<sup>2</sup> at 75 Pa (0.004 cfm/ft<sup>2</sup> at 1.57 psf).
      - 5) Assembly Air Leakage Resistance, ASTM E 2357: less than 0.2 L/s·m<sup>2</sup> (0.04 cfm/ft<sup>2</sup> at 1.57 psf).
    - c. Manufacturer - Basis of Design:
      - 1) Sto Corp; Sto Powerwall ci: [www.stocorp.com](http://www.stocorp.com).
        - (a) Sto Powerwall ci - Outbound.
      - 2) Other Acceptable Manufacturers.

- (a) Dryvit; Commercial Cement Plaster (CCP) 4 System: [www.dryvit.com](http://www.dryvit.com).  
3) Substitutions: See Section 016000 - Product Requirements.

## **2.03 ACCESSORIES**

- A. Lath: Minimum 2.5 lb./yd<sup>2</sup> (1.4 kg/m<sup>2</sup>) self-furred galvanized steel diamond mesh metal lath in compliance with ASTM C 847
- B. Bonding Compound: Provide type recommended for bonding plaster to solid surfaces, complying with ASTM C932.
- C. Reinforcing Mesh: 4.5 oz/sq yd (153 g/sq m) alkali-resistant mesh.
- D. Additional accessories as required for project and application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are properly in place.
- C. Verify mechanical and electrical equipment and services located within areas to receive this work have been properly tested and approved.
- D. Inspect for:
  - 1. Contamination – algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances.
  - 2. Surface absorption and chalkiness.
  - 3. Crack – measure crack width and record location of cracks.
  - 4. Damage and deterioration.
  - 5. Moisture damage – record any areas of moisture damage.
- E. Inspect sheathing application for compliance with manufacturer's requirement.
- F. Do not proceed with air/moisture barrier or stucco installation until deviations are corrected

### **3.02 PREPARATION**

- A. Roughen smooth concrete surfaces and apply bonding compound in accordance with manufacturer's written installation instructions.
- B. Remove surface contaminants and replace damaged sheathing.
- C. All sheathing must be handled and installed in compliance with applicable building code and/or manufacturer requirements.
- D. Spot surface defects in sheathing with joint treatment.

### **3.03 MIXING**

- A. Mix only as much plaster as can be used prior to initial set.
- B. Mix materials dry, to uniform color and consistency, before adding water.
- C. Protect mixtures from frost or freezing temperatures, contamination, and excessive evaporation.

### **3.04 APPLICATION**

- A. Apply plaster in accordance with manufacturer's written instructions and comply with ASTM C926.
- B. Base Coats:
  - 1. Apply base coat(s) to fully embed lath and to specified thickness.
  - 2. Follow guidelines in ASTM C926 and manufacturer's written installation instructions for moist curing base coats and application of subsequent coats.
- C. Leveling Coat:
  - 1. Apply leveling coat to specified thickness.

2. Fully embed reinforcing mesh in leveling coat.
- D. Finish Coats:
1. Cement Plaster:
    - a. Apply with sufficient material and pressure to ensure complete coverage of base.
    - b. Apply desired surface texture while mix is still workable.
    - c. Float to a consistent finish.
  2. Primer and Acrylic Coatings:
    - a. Remove surface contaminants such as dust and dirt without damaging substrate.
    - b. Apply primer in accordance with manufacturer's instructions.
    - c. Apply finish coating in number of coats and to thickness recommended by manufacturer.

### **3.05 TOLERANCES**

- A. Maximum Variation from True Flatness: 1/4 inch in 10 feet (6 mm in 3 m).

### **3.06 PROTECTION**

- A. Provide protection of installed materials from water infiltration into or behind them.
- B. Provide protection of installed stucco from dust, dirt, precipitation, and freezing.
- C. Provide protection of installed primer and finish from dust, dirt, precipitation, freezing and continuous high humidity until fully dry.
- D. Provide sealant and backer material at stucco terminations and at fixture penetrations through the stucco to protect against air, water and insect infiltration. Provide weeps at floor lines, window and door heads, and other areas to conduct water to the exterior.

### **3.07 REPAIR**

- A. Patching: Remove loose, damaged or defective plaster and replace with plaster of same composition; finish to match surrounding area.
- B. Clean and maintain the stucco finish for a fresh appearance and to prevent water entry into and behind the stucco. Repair cracks, impact damage, spalls or delamination promptly.
- C. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into the wall assembly.

**END OF SECTION 092400**

**SECTION 095100  
ACOUSTICAL CEILINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Suspended metal grid ceiling system.
- B. Acoustical units.
- C. Pyramidal Ceiling Diffuser Panels: Acoustical diffuser panels.

**1.02 RELATED REQUIREMENTS**

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 083100 - Access Doors and Panels: Access panels.
- C. Division 21 - Fire-Suppression Sprinkler Systems: Sprinkler heads in ceiling system.
- D. Division 23 - Air Outlets and Inlets: Air diffusion devices in ceiling system.
- E. Division 26 - Interior Lighting: Light fixtures in ceiling system.
- F. Division 28 - Fire Detection and Alarm: Fire alarm components in ceiling system.

**1.03 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 2020.
- 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 E119 - Standard Test Methods for Fire Tests of Building Construction and Materials 2020.
- F. 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.
- G. ASTM E1264 - Standard Classification for Acoustical Ceiling Products 2022.

**1.04 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.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, mechanical and electrical items installed in the ceiling, and locations where removable grid is required for access.
  - 1. Submit component and project specific installation drawings, cut sheets, and schedules showing all information necessary to fully explain the design features, appearance, function, fabrication, installation, and use of system components in all phases of operation.
  - 2. Include fabrication and installation details. Distinguish between factory and field work.
  - 3. Include plans, elevations, sections, attachments, and work by other trades.
  - 4. Include wiring diagrams when applicable.
  - 5. Indicate seismic bracing and fastening requirements as applicable.

- 6. Indicate compliance with design intent and layout, as specified on drawings.
- C. Product Data: Provide data on suspension system components and acoustical units.
- D. Samples: Submit two samples 12 by 12 inches in size illustrating material and finish of acoustical units.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- F. Maintenance instructions and recommendations.
- G. Manufacturer's Qualification Statement.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

## **1.06 QUALITY ASSURANCE**

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

## **1.07 FIELD CONDITIONS**

- A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

# **PART 2 PRODUCTS**

## **2.01 MANUFACTURERS**

- A. Acoustic Tiles/Panels:
  - 1. Basis-of-Design: Armstrong World Industries, Inc; Types as indicated on drawings ; Types as indicated on drawings: [www.armstrong.com/#sle](http://www.armstrong.com/#sle).
  - 2. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 3. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
  - 4. Hunter Douglas Architectural: [www.hunterdouglasarchitectural.com](http://www.hunterdouglasarchitectural.com).
  - 5. USG Corporation: [www.usg.com](http://www.usg.com).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Acoustical Diffusers:
  - 1. Basis-of-Design: Wenger Corporation: [www.wengercorp.com](http://www.wengercorp.com).
    - a. Substitutions: See Section 016000-Product Requirements.
- C. Suspension Systems:
  - 1. Same as for acoustical units.
  - 2. Substitutions: See Section 016000 - Product Requirements.

## **2.02 PERFORMANCE REQUIREMENTS**

- A. Fire-Resistance Rating: Determined in accordance with test procedures in ASTM E119 and complying with the following:
- B. Seismic Performance: Ceiling systems designed to withstand the effects of earthquake motions determined according to ASCE 7 for Seismic Design Category as indicated on Structural drawings and complying with the following:
  - 1. Local authorities having jurisdiction.
- C. Removable Grids: Provide removable grids for ceiling access where indicated on drawings.

## **2.03 ACOUSTICAL UNITS**

- A. Acoustical Units - General: ASTM E1264, Class A.
  - 1. VOC Content: As specified in Section 016116.

- B. Acoustical Tiles ACT-1: Painted mineral fiber, with the following characteristics:
  - 1. Application(s): as indicated on drawings.
  - 2. Classification: ASTM E1264 Type III.
  - 3. Sizes: 24 by 48 inches.
    - a. Locations are indicated on drawings.
  - 4. Thickness: 3/4 inch (19 mm).
  - 5. Tile Edge: match existing.
    - a. Joint: Kerfed and rabbeted.
  - 6. Color: As indicated on drawings.
  - 7. Suspension System: Exposed grid.
    - a. Match existing.

#### **2.04 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, splices, and grip clips (at removable grid locations) as required.
  - 1. Materials:
    - a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.

#### **2.05 ACCESSORIES**

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
- B. Hanger Wire: 12-gage 0.08 inch (2 mm) 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. Grip Clips: Manufacturer's standard for joining main beams to cross tees with locking barbs without the use of pop rivets or screws. Provide cross tee adapter clips where required. Provide custom accessories if manufacturer's standard does not accommodate access requirements indicated on drawings.
- F. Touch-up Paint: Type and color to match acoustical and grid units.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

#### **3.02 PREPARATION**

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.
- C. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

#### **3.03 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.
  - 1. Center system in room, unless otherwise specifically noted on drawings. Follow guidelines for placement as indicated on drawings. If not indicated, request layout from Architect prior to beginning installation.
- 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. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
  - G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
  - H. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.
  - I. Do not eccentrically load system or induce rotation of runners.
  - J. Form expansion joints as detailed. Form to accommodate plus or minus 1 inch (25 mm) movement. Maintain visual closure.
  - K. Install light fixture boxes constructed of gypsum board above light fixtures in accordance with fire rated assembly requirements and light fixture ventilation requirements.

#### **3.04 INSTALLATION - ACOUSTICAL UNITS**

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Lay directional patterned units as indicated.
- D. Fit border trim neatly against abutting surfaces.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
  1. Cut to fit irregular grid and perimeter edge trim.
  2. Make field cut edges of same profile as factory edges.
  3. Double cut and field paint exposed reveal edges.
- G. Where round obstructions occur, provide preformed closures to match perimeter molding.

#### **3.05 TOLERANCES**

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet (3 mm in 3 m).
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

**END OF SECTION 095100**

**SECTION 096500  
RESILIENT FLOORING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 090561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

**1.03 REFERENCE STANDARDS**

- A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source 2019a, with Editorial Revision (2020).
- B. ASTM F1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing 2004 (Reapproved 2021).
- C. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile 2020.
- D. ASTM F1861 - Standard Specification for Resilient Wall Base 2021.
- E. ASTM F2169 - Standard Specification for Resilient Stair Treads 2015 (Reapproved 2020).
- F. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source 2023.
- G. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings 2011.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
  - 1. Finishing: Include manufacturer's finish instructions and recommendations.
- C. Shop Drawings: Indicate seaming plans, floor patterns, and transition details.
- D. Verification Samples: Submit two samples, actual size illustrating color and pattern for each resilient flooring product specified.
- E. Sustainable Design Submittal: Submit VOC content documentation for flooring and adhesives.
- F. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
  - 1. Submit evidence of compliance with flooring manufacturer's specifications.
- G. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.
- H. Manufacturer's Qualification Statement.
- I. Installer's Qualification Statement.
- J. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.
- K. 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: 200 square feet (18.5 square meters) of each type and color.
  - 3. Extra Wall Base: 20 linear feet (6 linear meters) of each type and color.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum twenty years documented experience.

- B. Installer Qualifications: Company specializing in installing specified flooring with minimum five years documented experience.
  - 1. Employer of workers for this Project who are competent in techniques required by manufacturer for resilient flooring installation indicated.
- C. Testing Agency Qualifications: Independent firm specializing in performing concrete slab moisture testing and inspections of the type specified in this section.

#### **1.06 MOCK-UP**

- A. Provide 10 ft x 10 ft minimum mock-up for each type of resilient flooring.
- B. Mock-up may remain as part of the work.

#### **1.07 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 temperatures recommended by Manufacturer.
- D. Do not double stack pallets.

#### **1.08 FIELD CONDITIONS**

- A. Follow manufacturer's recommendations.
- B. Install flooring only after all other trades, including painting and overhead work, has been completed.

### **PART 2 PRODUCTS**

#### **2.01 TILE FLOORING**

- A. Monolithic Solid Vinyl Tile (LVT) - Homogeneous Tile, ASTM F1700 Class I - Monolithic Solid Vinyl Tile, Type A (Smooth): Solid vinyl with color and pattern throughout thickness.
  - 1. Manufacturers:
    - a. Tarket; Luxury Vinyl Tiles: [www.commercial.tarkett.com](http://www.commercial.tarkett.com).
    - b. Basis-of-Design: Patcraft; [www.patcraft.com](http://www.patcraft.com).
    - c. Substitutions: See Section 016000 - Product Requirements.
  - 2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
  - 3. Size: As indicated on drawings.
  - 4. Total Thickness: 0.125 inch (3 mm).
  - 5. Pattern: As indicated on drawings.
  - 6. Color: As indicated on drawings.

#### **2.02 RESILIENT BASE**

- A. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic; top set Style B, Cove.
  - 1. Manufacturers:
    - a. Basis-of-Design: Johnsonite, a Tarkett Company: [www.johnsonite.com](http://www.johnsonite.com).
    - b. Substitutions: See Section 016000 - Product Requirements.
  - 2. Height: 4 inch (100 mm).
    - a. Unless otherwise indicated on drawings.
  - 3. Thickness: 0.125 inch (3.2 mm).
  - 4. Finish: Satin.
  - 5. Length: Roll.
  - 6. Color: As indicated on drawings.
  - 7. Accessories: Premolded external corners, internal corners, and end stops.

#### **2.03 ACCESSORIES**

- A. Subfloor Filler: Portland-based patching and leveling compounds; type recommended by adhesive material manufacturer.

- B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
- C. Resilient corner guards: Homogeneous composition vinyl polymer.
  - 1. VOC Content Limits: As specified in Section 016116.
  - 2. Size: 8 foot lengths.
  - 3. Color: Architect to select from manufacturer's standard colors.
  - 4. Manufacturer's standard as recommended for application.
  - 5. Manufacturers:
    - a. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - b. Tarkett; [www.tarkett.com](http://www.tarkett.com).
    - c. Substitutions: Section 01 6000 - Product Requirements.
- D. Moldings, Transition and Edge Strips: Same material as flooring.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

### **3.02 PREPARATION**

- A. Remove existing resilient flooring and flooring adhesives; follow the recommendations of RFCI (RWP).
  - 1. Unless more stringent conditions are required by manufacturer.
- B. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- C. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- D. Prohibit traffic until filler is fully cured.
- E. Clean substrate.
- F. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

### **3.03 INSTALLATION - GENERAL**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- D. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- E. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

### **3.04 INSTALLATION - SHEET FLOORING**

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Cut sheet at seams in accordance with manufacturer's instructions.
- C. Seal seams by heat welding where indicated.

### **3.05 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.

### **3.06 INSTALLATION - RESILIENT BASE**

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches (45 mm) between joints.
- B. Use premolded corners.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

### **3.07 CLEANING**

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean, seal, and wax in accordance with manufacturer's written instructions.

### **3.08 PROTECTION**

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

**END OF SECTION 096500**

## **SECTION 096813 TILE CARPETING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Carpet tile, fully adhered.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 090561 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.
- B. Section 090561 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

#### **1.03 REFERENCE STANDARDS**

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials 2016 (Reapproved 2021).
- B. CRI 104 - Standard for Installation of Commercial Carpet 2015.
- C. CRI (GLP) - Green Label Plus Testing Program - Certified Products Current Edition.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
  - 1. Include statement of VOC compliance.
- C. Shop Drawings: Indicate layout of joints, direction of carpet pile, location of edge moldings, and interface with adjacent materials.
- D. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- E. Sustainable Design Submittal: Submit VOC content documentation for adhesives.
- F. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- G. Installer's Qualification Statement.
- H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum ten years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum five years documented experience and approved by carpet tile manufacturer.

#### **1.06 FIELD CONDITIONS**

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Tile Carpeting:
  - 1. Tarkett; [www.commercial.tarkett.com](http://www.commercial.tarkett.com)
  - 2. Shaw Floors; [www.shawfloors.com](http://www.shawfloors.com)

3. Substitutions: See Section 016000 - Product Requirements.

## **2.02 MATERIALS**

- A. Tile Carpeting: Tufted or fusion bonded, as specified by basis-of-design product type, manufactured in one color dye lot.
  1. Products, colors, styles and patterns as indicated on drawings.
    - a. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
    - b. VOC Content: Comply with Section 016116.
    - c. VOC Content: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable.
    - d. PVC, phthalates or PBD / PBDE ingredients are not allowed.

## **2.03 ACCESSORIES**

- A. Edge Strips: Manufacturer's standard.
  1. Unless otherwise indicated on drawings.
- B. Adhesives:
  1. Compatible with materials being adhered; maximum VOC content as specified in Section 016116.
- C. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive carpet tile.
- C. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
  1. Conduct tests by an independent testing agency acceptable to Owner.
    - a. See Section 090561.
  2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
  3. Follow moisture and alkalinity remediation procedures in Section 090561.
- E. Verify that required floor-mounted utilities are in correct location.

### **3.02 PREPARATION**

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.

### **3.03 INSTALLATION**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile as indicated on drawings.

1. If layout is not indicated on drawings, request pattern and / or layout from Architect prior to installation.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
  1. Adhere carpet in accordance with manufacturer's instructions and recommendations.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

#### **3.04 CLEANING**

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

**END OF SECTION 096813**



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**SECTION 099113  
EXTERIOR PAINTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
  - 1. Mechanical and Electrical: As indicated on drawings.
- 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. Marble, granite, slate, and other natural stones.
  - 8. Floors, unless specifically indicated.
  - 9. Ceramic and other types of tiles.
  - 10. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
    - a. Unless otherwise indicated at existing materials to remain on drawings.
  - 11. Exterior insulation and finish system (EIFS).
  - 12. Glass.
  - 13. Concrete masonry units in utility, mechanical, electrical, and concealed spaces.
  - 14. Concealed pipes, ducts, and conduits.

**1.02 RELATED REQUIREMENTS**

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 055000 - Metal Fabrications: Shop-primed items.
- C. Section 055100 - Metal Stairs: Shop-primed items.
- D. Section 078123 - Intumescent Fire Protection.
- E. Section 099123 - Interior Painting.

**1.03 DEFINITIONS**

- A. Conform to ASTM D16 for interpretation of terms used in this section.

**1.04 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 D4258 - Standard Practice for Surface Cleaning Concrete for Coating 2005 (Reapproved 2017).
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- D. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board 2020.
- E. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.

- F. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- G. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- H. SSPC-SP 6 - Commercial Blast Cleaning 2007.
- I. SSPC-SP 13 - Surface Preparation of Concrete 2018.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
  - 4. Manufacturer's installation instructions.
  - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
  - 6. Confirmation that top coat is compatible with primer used for steel fabrications.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) 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, submit each color in each sheen available.
  - 3. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry and factory finished metals, have been approved.
- D. Samples: Submit two paper "draw down" samples, 8-1/2 x 11 inch (216 x 279 mm) in size illustrating range of colors and textures available for each surface finishing product scheduled.
- E. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- F. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.
- G. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- H. 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: 5 gallons (19 L) of each color and type; from the same product run, store where directed.
  - 3. Label each container with color, type, and location in addition to the manufacturer's label.
    - a. Match paint type designations indicated on drawings for each paint type.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and approved by manufacturer.
- C. The Contractor shall receive written confirmation of the specific surface preparation procedures and primers used for all fabricated steel items from the fabricator / supplier to ascertain appropriate and manufacturer compatible finish coat materials to be used before painting any such work. Coordinate all shop and / or field-applied primers with topcoat.

#### **1.07 MOCK-UP**

- A. See Section 014000 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, 10 feet (3 m) long by 10 feet (3 m) wide, illustrating paint color, texture, and finish.
- C. Provide door and frame assembly illustrating paint color, texture, and finish.
- D. Locate where directed by Architect.
- E. Mock-up may remain as part of the work.

#### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

#### **1.09 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F (10 degrees C) for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Primer Sealers: Same manufacturer as top coats.
- C. Block Fillers: Same manufacturer as top coats.
- D. Paints:
  - 1. Sherwin-Williams Company: [www.sherwin-williams.com](http://www.sherwin-williams.com).
  - 2. PPG Paints: [www.ppgpaints.com](http://www.ppgpaints.com).
- E. Primer Sealers: Same manufacturer as top coats.
- F. Substitutions: See Section 016000 - Product Requirements.

#### **2.02 PAINTS AND FINISHES - GENERAL**

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
  - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at [www.paintinfo.com](http://www.paintinfo.com), for specified MPI categories, except as otherwise indicated.
  - 2. Provide 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.
  - 3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
  5. Supply each paint material in quantity required to complete entire project's work from a single production run.
  6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
  7. All materials used shall be lead and mercury free.
- B. Volatile Organic Compound (VOC) Content: Comply with Section 016116.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: As indicated on drawings.

## **2.03 PAINT SYSTEMS - EXTERIOR**

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including .
1. Two top coats and one coat primer.
- B. Existing Masonry / Concrete, Opaque Paint System, Latex, 3 Coat:
1. Prepare existing masonry / concrete in accordance with manufacture's specifications. Verify products to be used with manufacturer's field representative based on project specific conditions.
  2. One coat of SW LX2W50, Loxon Concrete & Masonry Primer.
    - a. Without existing paint.
  3. One Coat of SW LX03W0100, Loxon Acrylic Conditioner.
    - a. With existing paint.
  4. Flat: Two coats of SW A6-100 Series, A-100 Exterior Latex Flat.
    - a. With or without existing paint.
  5. One coat of PPG Rhino Grip Primer SPC68000.
    - a. With or without existing paint.
  6. Flat: Two coats of PPG Rhinocryl Supreme 67101.
    - a. With or without existing paint.
- C. Concrete & Stucco – Self Cleaning System, Latex, 3 Coat:
1. One coat SW LX2W50, Loxon Concrete & Masonry Primer.
  2. Flat: Two coats of SW LX13W51 Loxon Self Cleaning Acrylic.
  3. One coat of PPG Rhino Grip Primer SPC68000.
  4. Flat: Two coats of PPG Perma-Crete Self-Cleaning Acrylic High Build, A-22XI.
- D. CMU, Opaque Waterproofing System, Latex, 3 Coat:
1. One coat SW CF1W50, ConFlex Block Filler.
  2. Flat: Two coats of SW CF11W51 Series, ConFlex XL Elastomeric Smooth.
  3. One coat of PPG Speedhide Block Filler, 6-15XI.
  4. Flat: Two coats of PPG Perma-Crete Pitt-Flex, Elastomeric Smooth, 4-110XI.
- E. Ferrous Metals, (doors, frames, & handrails), Primed, Latex, 2 Coat:
1. Touch-up with SW B66-310 Series, Pro-Cryl Universal Water Based Primer.
  2. Semi-gloss: Two coats of B53-1150 Series, WB Alkyd Urethane Enamel Semi-Gloss.
  3. One coat of PPG Pitt-Tech Plus DTM Primer, 4029 PF.
  4. Semi-gloss: Two coats of PPG Pitt-Flex Plus S/G 4216 HP or Speedhide WB Alkyd S/G, 6-1510XI.
- F. Galvanized Metals, Latex, 3 Coat:
1. One coat of SW B66-310 Series, Pro-Cryl Universal Water Based Primer.
  2. Gloss: Two coats of of B66-600 Series, Pro Industrial Acrylic Gloss.
  3. One coat of PPG Pitt-Tech Plus DTM Primer, 4020 PF.
  4. Gloss: Two coats of PPG Pitt-Tech Gloss 90-374 or Pitt-Tech Plus Gloss 90-1310.

## **2.04 ACCESSORY MATERIALS**

TPS Memorial Highschool - New

Facade and Secure Entry

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Exterior Painting

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- 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.
  - 1. Unless otherwise recommended by manufacturer.
- C. Fastener Head Cover Material: Latex filler.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  - 1. Exterior Plaster and Stucco: 12 percent.
  - 2. Fiber Cement Siding: 12 percent.
  - 3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
  - 4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
  - 5. Concrete Floors and Traffic Surfaces: 8 percent.
  - 6. Unless otherwise recommended by manufacturer.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or 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 for finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. 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. Clean surfaces with pressurized water. Use pressure range of 1500 to 4000 psi (10,350 to 27,580 kPa) at 6 to 12 inches (150 to 300 mm). Allow to dry.
  - 3. Clean concrete according to ASTM D4258. Allow to dry.
  - 4. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- H. Masonry:
  - 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or 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 1500 psi (4140 to 10,350 kPa) at 6 to 12 inches (150 to 300 mm). Allow to dry.

- I. Fiber Cement Siding: Remove dirt, dust and other foreign matter with a stiff fiber brush. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
- J. Exterior Gypsum Board: Fill minor defects with exterior filler compound. Spot prime defects after repair.
- K. Exterior Plaster: Fill hairline cracks, small holes, and imperfections with exterior patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- L. Asphalt, Creosote, or Bituminous Surfaces: Remove foreign particles to permit adhesion of finishing materials. Apply latex based sealer or primer.
- M. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- N. 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.
- O. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- P. Copper: Remove contamination by steam, high pressure water, or solvent washing.
- Q. 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.
- R. 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.
- S. 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 calking compound after prime coat has been applied. Back prime concealed surfaces before installation.
- T. Exterior Wood to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior calking compound after sealer has been applied. Prime concealed surfaces.
- U. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- V. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with tinted primer.
- W. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

### **3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. 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. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- H. Sand wood and metal surfaces lightly between coats to achieve required finish.
- I. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- J. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- K. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

#### **3.04 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection.
- B. Inspect and test questionable coated areas in accordance with Manufacturer's recommendations.

#### **3.05 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

#### **3.06 PROTECTION**

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

#### **3.07 COLOR SCHEDULE**

- A. As indicated on drawings.

**END OF SECTION 099113**



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**SECTION 099123  
INTERIOR PAINTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
  - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
  - 2. Prime surfaces to receive wall coverings.
  - 3. 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 all areas, paint shop-primed items.
    - c. Paint interior surfaces of air ducts and convactor and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
    - d. Paint dampers exposed behind louvers, grilles, and convactor and baseboard cabinets to match face panels.
- 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. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
    - a. Unless otherwise indicated on drawings.
  - 10. Glass.
  - 11. Concrete masonry units in utility, mechanical, and electrical spaces.
  - 12. Acoustical materials, unless specifically indicated.
  - 13. Concealed pipes, ducts, and conduits.

**1.02 RELATED REQUIREMENTS**

- A. Section 055000 - Metal Fabrications: Shop-primed items.
- B. Section 099113 - Exterior Painting.

**1.03 DEFINITIONS**

- A. Comply with ASTM D16 for interpretation of terms used in this section.

**1.04 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 D4258 - Standard Practice for Surface Cleaning Concrete for Coating 2005 (Reapproved 2017).

- D. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.
- E. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board 2020.
- F. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.
- G. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- H. SCAQMD 1113 - Architectural Coatings 1977, with Amendment (2016).
- I. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).
- J. SSPC-SP 2 - Hand Tool Cleaning 2018.
- K. SSPC-SP 3 - Power Tool Cleaning 2018.
- L. SSPC-SP 6 - Commercial Blast Cleaning 2007.
- M. SSPC-SP 13 - Surface Preparation of Concrete 2018.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
  - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
  - 2. MPI product number (e.g. MPI #47).
  - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
  - 4. Manufacturer's installation instructions.
  - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
  - 6. Confirmation that top coat is compatible with primer used for steel fabrications.
- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches (216 by 279 mm) 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, submit each color in each sheen available.
  - 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, care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
  - 1. Match schedule indicated on drawings.
- 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: 5 gallons (19 L) of each color and type; from the same product run, store where directed.
  - 3. Label each container with color, type, and room locations in addition to the manufacturer's label.
    - a. Match paint type designations indicated on drawings for each paint type.

#### **1.06 EXTRA STOCK**

- A. Provide a 5-gallon container of each color to Owner.

- B. Label each container with color, color number, texture, and room locations, in addition to the manufacturer's label.

### **1.07 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience.
- C. The Contractor shall receive written confirmation of the specific surface preparation procedures and primers used for all fabricated steel items from the fabricator / supplier to ascertain appropriate and manufacturer compatible finish coat materials to be used before painting any such work. Coordinate all shop and / of field-applied primers with topcoat.

### **1.08 MOCK-UP**

- A. See Section 014000 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, 10 feet long by 10 feet wide, illustrating paint color, texture, and finish.
- C. Provide door and frame assembly illustrating paint color, texture, and finish.
- D. Locate where directed by Architect.
- E. Mock-up may remain as part of the work.

### **1.09 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F (7 degrees C) and a maximum of 90 degrees F (32 degrees C), in ventilated area, and as required by manufacturer's instructions.

### **1.10 FIELD CONDITIONS**

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply materials when relative humidity exceeds 85 percent; at temperatures less than 5 degrees F (3 degrees C) above the dew point; or to damp or wet surfaces.
- D. Minimum Application Temperatures for Paints: 50 degrees F (10 degrees C) for interiors unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles (860 lx) measured mid-height at substrate surface.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Provide paints and finishes from the same manufacturer to the greatest extent possible.
  - 1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
  - 2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
- B. Paints:
  - 1. Sherwin-Williams Company: [www.sherwin-williams.com](http://www.sherwin-williams.com).
  - 2. PPG Paints: [www.ppgpaints.com](http://www.ppgpaints.com).
- C. Primer Sealers: Same manufacturer as top coats.

- D. Block Fillers: Same manufacturer as top coats.
- E. Substitutions: See Section 016000 - Product Requirements.

## **2.02 PAINTS AND FINISHES - GENERAL**

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
  - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at [www.paintinfo.com](http://www.paintinfo.com), for specified MPI categories, except as otherwise indicated.
  - 2. Provide 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.
  - 3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
  - 4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
  - 5. Supply each paint material in quantity required to complete entire project's work from a single production run.
  - 6. 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: Comply with Section 016116.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: As indicated on drawings.
  - 1. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
    - a. Unless otherwise indicated on drawings.
  - 2. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

## **2.03 PAINT SYSTEMS - INTERIOR**

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry units, brick, wood, plaster, uncoated steel, shop primed steel, galvanized steel, and aluminum.
  - 1. Two top coats and one coat primer.
- B. Wood, Opaque, Latex, 3 Coat:
  - 1. One coat of SW B28W8111, Premium Wall & Wood Interior Latex Primer
  - 2. Semi-Gloss: Two coats of SW B34W8251, ProMar 200 Waterbased Acrylic-Alkyd Semi-Gloss.
  - 3. One Coat: PPG 68000 Rhino Grip Interior Wall & Wood Primer.
  - 4. Two Coats: PPG 6-1510XI Speedhide WB Acrylic Alkyd Semi- Gloss Enamel.
- C. Wood, Transparent, Varnish, Stain:
  - 1. One coat of Minwax Performance Series Tintable Interior Stain 7150/7151.
  - 2. One coat Minwax Performance Fast-Dry, Sanding Sealer 81580.
  - 3. Satin: Two coats of Minwax Performance Series Fast-Dry Varnish 9150/9151 Series.
  - 4. One Coat: PPG Deft DFT 300 Series Oil Base Wiping Stain.
  - 5. One Coat: PPG Deft WB Sanding Sealer, DFT 61 Series.
  - 6. Two Coats: PPG Deft WB Satin Varnish, DFT 159 Oil Base Satin Clear Varnish.
- D. Concrete/Masonry, Opaque, Latex, 3 Coat:
  - 1. One coat of SW LX2W50, Loxon Concrete & Masonry Primer.
  - 2. Flat: Two coats of SW B30-2600 Series, ProMar 200 Zero VOC Interior Latex Flat.
  - 3. One Coat: PPG 68000 Rhino Grip Interior Concrete & Masonry Primer.

4. Two Coats: PPG 6-4110XI Speedhide Zero Voc Interior Latex Flat.
- E. Ferrous Metals (doors, frames, & handrails), Unprimed, Latex, 3 Coat:
  1. One coat of SW B66-310 Series, Pro-Cryl Universal Water Based Primer.
  2. Semi-gloss: Two coats of B53-1150 Series, WB Alkyd Urethane Enamel Semi-Gloss.
  3. One Coat: PPG 4020 Pitt- Tech Plus DTM Acrylic Universal Primer.
  4. Three Coats: PPG 6-1510XI Speedhide WB Acrylic Alkyd Semi- Gloss Enamel.
- F. Galvanized Metals, Latex, 3 Coat:
  1. One coat of SW B66-310 Series, Pro-Cryl Universal Water Based Primer.
  2. Semi-gloss: Two coats of B66-650 Series, Pro Industrial Acrylic Semi-Gloss.
  3. One Coat: PPG 4020 Pitt- Tech Plus DTM Acrylic Universal Primer.
  4. Two Coats: PPG 4216 Pitt- Tech Plus DTM Acrylic Semi- Gloss Enamel.
- G. Aluminum, Unprimed, Latex, 3 Coat:
  1. One coat of SW B66-310 Series, Pro-Cryl Universal Water Based Primer.
    - a. Alternate: Great Lakes Laboratories Clean 'n Etch.
  2. Semi-gloss: Two coats of B66-650 Series, Pro Industrial Acrylic Semi-Gloss.
  3. One Coat: PPG 701/702 Spectracon Metal Wash Primer.
  4. Two Coats: PPG 4216 Pitt- Tech Plus DTM Acrylic Semi- Gloss Enamel.
- H. Concrete/Masonry, Epoxy Enamel, 3 Coat: (typically wet areas)
  1. One coat of SW LX2W50, Loxon Concrete & Masonry Primer.
  2. Gloss: Two coats of SW B73V300 Series, Waterborne Catalyzed Epoxy Gloss.
  3. One Coat: PPG 68000 Rhino Grip Interior Concrete & Masonry Primer.
  4. Two Coats: PPG 98E-51 Aquapon WB EP Water Based Epoxy Gloss.
- I. CMU, Pre-Catalyzed Epoxy Finish Eg-Shel, Latex, 3 Coat:
  1. One coat SW CF1W50, ConFlex Block Filler.
  2. Eg-Shel: Two coats of SW K45W01100 Series, Pre-Catalyzed Waterbased Epoxy Eg-Shell.
  3. One Coat: PPG 6-15XI Speedhide Int/Ext Latex Block Filler.
  4. Two Coats: PPG 16-310 Pitt- Glaze Precatalyzed Water Based Epoxy Eggshell.
- J. Gypsum Board/Plaster, Latex Flat Finish, 3 Coat:
  1. One coat of B28W2600, ProMar 200 Zero VOC Interior Latex Primer.
  2. Flat: Two coats of B30-2600 Series, ProMar 200 Zero VOC Interior Latex Flat.
  3. One Coat: PPG 6-4900XI Speedhide Zero Voc Interior Latex Wall Primer.
  4. Two Coats: PPG 6-4110XI Speedhide Zero Voc Interior Latex Flat.
- K. Gypsum Board/Plaster, Latex Egg-Shell Finish, 3 Coat:
  1. One coat of B28W2600, ProMar 200 Zero VOC Interior Latex Primer.
  2. Eggshell: Two coats of K45W01151, Pro Industrial Pre-Catalyzed Epoxy Latex Eg-Shell.
  3. One Coat: PPG 6-4900XI Speedhide Zero Voc Interior Latex Primer.
  4. Two Coats: PPG 16-310 Pitt- Glaze Precatalyzed Water Based Epoxy Eggshell.
- L. Gypsum Board/Plaster, Latex-Acrylic Semi-Gloss Finish, 3 Coat:
  1. One coat of B28W2600, ProMar 200 Zero VOC Interior Latex Primer.
  2. Semi-gloss: Two coats of B31-2600 Series, ProMar 200 Zero VOC Interior Latex Semi-Gloss.
  3. One Coat: PPG 6-4900XI Speedhide Zero Voc Interior Latex Wall Primer
  4. Two Coats: PPG 6-4310XI Speedhide Zero Voc Interior Latex Eggshell OR
    - a. Alternate: Two Coats: PPG 6-4510XI Speedhide Zero Voc Interior Latex Semi- Gloss
- M. Fabrics/Insulation Jackets, Latex, 3 Coat:
  1. One coat of SW B66-310 Series, Pro-Cryl Universal Water Based Primer.
  2. Semi-gloss: Two coats of B66-650 Series, Pro Industrial Acrylic Semi-Gloss.
  3. One Coat: PPG 4020 Pitt- Tech Plus DTM Acrylic Universal Primer.
  4. Two Coats: PPG 4216 Pitt- Tech Plus DTM Acrylic Semi- Gloss Enamel.
- N. Metal Decking DryFall Finish, Latex Flat, 2 Coat:

1. Flat: Two coats of B42W181, Pro Industrial Waterborne Acrylic DryFall Flat.
  2. Two Coats: PPG 6-725XI Speedhide Super Tech Interior Latex Flat Dryfall.
- O. Metal Decking DryFall Finish, Latex Eg-Shel, 2 Coat:
1. Eg-Shel: Two coats of B42W82, Pro Industrial Waterborne Acrylic DryFall Eg-Shell.
  2. Two Coats: PPG 6-724XI Speedhide Super- Tech Interior Latex Eggshell Dry Fall.
- P. Paint I-TR-C - Transparent Finish on Concrete Floors.
1. 2 coats sealer.

## **2.04 ACCESSORY MATERIALS**

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
1. Unless otherwise recommended by manufacturer.
- C. Fastener Head Cover Material: Latex filler.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Gypsum Wallboard: 12 percent.
  2. Plaster and Stucco: 12 percent.
  3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
  4. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
  5. Concrete Floors and Traffic Surfaces: 8 percent.
  6. Unless otherwise recommended by manufacturer.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or 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. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. 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. Clean surfaces with pressurized water. Use pressure range of 1,500 to 4,000 psi (10,350 to 27,580 kPa) at 6 to 12 inches (150 to 300 mm). Allow to dry.
  3. Clean concrete according to ASTM D4258. Allow to dry.

4. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- H. Masonry:
1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or 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 (4,140 to 10,350 kPa) at 6 to 12 inches (150 to 300 mm). Allow to dry.
- I. 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.
- J. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- K. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- L. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- M. Aluminum: Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
- N. Copper: Remove contamination by steam, high pressure water, or solvent washing.
- O. 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.
- P. 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.
- Q. 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.
- R. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- S. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.
- T. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

### **3.03 APPLICATION**

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- 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. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.
- J. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

#### **3.04 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection.
- B. Inspect and test questionable coated areas in accordance with Manufacturer's recommendations.

#### **3.05 CLEANING**

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

#### **3.06 PROTECTION**

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

#### **3.07 COLOR SCHEDULE**

- A. As indicated on drawings.

**END OF SECTION 099123**

## **SECTION 101400 SIGNAGE**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Building identification signs.
  - 1. Interior and exterior illuminated and non-illuminated signage.
  - 2. Digital logos and graphics for signage are available upon request.

#### **1.02 RELATED REQUIREMENTS**

- A. Division 5 - Metals: Support framing and backing and delegated design engineering for signage attachment to building.
- B. Division 26 - Electrical: Power for sign lighting.

#### **1.03 REFERENCE STANDARDS**

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.
- B. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Shop Drawings: For each type of sign. Include attachment details, materials, finishes, seam locations, methods for drainage for exterior signs, power feed and lighting types.
- D. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
  - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
  - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
  - 3. Submit for approval by Owner through Architect prior to fabrication.
- E. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- F. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- G. Verification Samples: Submit samples showing colors specified.
- H. Manufacturer's Installation Instructions: Include installation templates and attachment devices.
- I. Qualification Statement: For Manufacturer and Installer.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Curved Sign Media Suction Cups: One for each 100 signs; for removing media.

#### **1.05 COORDINATION**

- A. Confirm Room Names and Numbers.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty years of documented experience.

- B. Installer Qualification: Same as or approved by Manufacturer.

## **1.07 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.

## **1.08 FIELD CONDITIONS**

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

## **PART 2 PRODUCTS**

### **2.01 SIGNAGE APPLICATIONS**

- A. Other Dimensional Letter Signs: Wall-mounted.
  - 1. Locations and types are indicated on drawings.

### **2.02 SIGN TYPES**

- A. Flat Signs: Signage media without frame, unless otherwise indicated.
  - 1. Edges: Square.
  - 2. Corners: Square.
  - 3. Clear Cover: For customer produced sign media, provide clear cover of polycarbonate plastic, glossy on back, non-glare on front.
  - 4. Wall Mounting of One-Sided Signs: Tape adhesive, except in cases where mounted on glass. In those cases, provide matching acrylic panel backing to hide adhesive.
  - 5. Wall and Ceiling Mounting of Two-Sided Signs: Aluminum wall bracket, powder coated, color selected from manufacturer's standard colors, attached with screws in predrilled mounting holes, set in clear silicone sealant, unless otherwise indicated.
  - 6. Suspended Mounting: Stainless steel suspension cables, cable clamps, and ceiling fastener suitable for attachment to ceiling construction indicated, unless otherwise indicated.
- B. Radius / Curved Signs: One-piece, curved extruded aluminum media holder securing flat, flexible sign media by curved lip on two sides; other two sides closed by end caps; concealed mounting attachment.
  - 1. Sizes: As indicated on drawings.
  - 2. Finish: Natural (clear) anodized.
  - 3. Sign Orientation: Curved in horizontal section.
  - 4. End Caps: Aluminum with finish matching frame and stainless steel screw attachment.
  - 5. End Caps: Plastic, color selected from manufacturer's standard colors, paintable.
  - 6. Clear Cover: For customer produced sign media, provide clear cover of polycarbonate plastic, glossy on back, non-glare on front.
  - 7. Wall Mounting of One-Sided Signs: Mechanical anchorage, with predrilled holes, and set in clear silicone sealant.
  - 8. Wall and Ceiling Mounting of Two-Sided Signs: Aluminum wall bracket, powder coated, color selected from manufacturer's standard colors, attached with screws in predrilled mounting holes, set in clear silicone sealant.
  - 9. Mounting of Floor Mounted Pylon Signs: Oval shaped steel base anchored to floor.
  - 10. Suspended Mounting: Stainless steel suspension cables, cable clamps, and ceiling fastener suitable for attachment to ceiling construction indicated.
  - 11. Directories: For customer-produced media; provide divider strips.
- C. Color and Font: Unless otherwise indicated:
  - 1. Character Font: As indicated on drawings.
  - 2. Character Case: As indicated on drawings.
  - 3. Background Color: As indicated on drawings.

4. Character Color: Contrasting color.

### **2.03 ACCESSORIES**

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
- B. Exposed Screws: Stainless steel.
- C. Tape Adhesive: Double sided tape, permanent adhesive.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Exposed stickers or labels are not allowed. If UL stickers are required by AHJ, install where concealed from view.
- C. Install neatly, with horizontal edges level.
- D. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- E. Protect from damage until Substantial Completion; repair or replace damaged items.

**END OF SECTION 101400**

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**SECTION 104400  
FIRE PROTECTION SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.

**1.03 REFERENCE STANDARDS**

- A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).
- B. FM (AG) - FM Approval Guide current edition.
- C. NFPA 10 - Standard for Portable Fire Extinguishers 2022.
- D. UL (DIR) - Online Certifications Directory Current Edition.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, anchorage details, and installation instructions.
- C. Shop Drawings: Indicate locations of cabinets and cabinet physical dimensions.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- E. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

**1.05 FIELD CONDITIONS**

- A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Fire Extinguishers:
- B. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Ansul, a Tyco Business: [www.ansul.com](http://www.ansul.com).
  - 2. Kidde, a unit of United Technologies Corp: [www.kidde.com](http://www.kidde.com).
  - 3. Nystrom, Inc: [www.nystrom.com](http://www.nystrom.com).
  - 4. Oval Brand Fire Products; Oval Dry Chemical Fire Extinguisher - Multipurpose ABC: [www.ovalfireproducts.com](http://www.ovalfireproducts.com).
  - 5. Potter-Roemer: [www.potterroemer.com](http://www.potterroemer.com).
  - 6. Pyro-Chem, a Tyco Business: [www.pyrochem.com](http://www.pyrochem.com).
  - 7. Substitutions: See Section 016000 - Product Requirements.
- C. Fire Extinguisher Cabinets and Accessories:
- D. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Activar Construction Products Group - JL Industries: [www.activarcpg.com](http://www.activarcpg.com).
  - 2. Kidde, a unit of United Technologies Corp: [www.kidde.com](http://www.kidde.com).
  - 3. Larsen's Manufacturing Co: [www.larsensmfg.com](http://www.larsensmfg.com).
  - 4. Nystrom, Inc: [www.nystrom.com](http://www.nystrom.com).

5. Oval Brand Fire Products; Cabinets for Low Profile Extinguishers:  
www.ovalfireproducts.com.
6. Potter-Roemer: www.potterroemer.com.
7. Substitutions: See Section 016000 - Product Requirements.

## **2.02 FIRE EXTINGUISHERS**

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
  1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
  1. Cartridge Operated: Spun shell.
  2. Class: A:B:C type.
  3. Size: 20 pound (9.1 kg).
    - a. Unless larger sizes are required by AHJ.
  4. Size and classification as scheduled.
  5. Finish: Baked polyester powder coat, color as selected.
  6. Temperature range: Minus 65 degrees F (Minus 54 degrees C) to 175 degrees F (79.5 degrees C).

## **2.03 FIRE EXTINGUISHER CABINETS**

- A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.
- B. Cabinet Construction: Non-fire rated.
  1. Unless otherwise required for application and location.
    - a. Formed primed steel sheet; 0.036 inch (0.9 mm) thick base metal.
- C. Fire Rated Cabinet Construction: One-hour fire rated.
  1. Steel; double wall or outer and inner boxes with 5/8 inch (15.9 mm) thick fire barrier material.
- D. Cabinet Configuration: Semi-recessed type.
  1. Size to accommodate accessories.
  2. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
- E. Door: 0.036 inch (0.9 mm) metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge.
- F. Door Glazing: Float glass, clear, 1/8 inch (3 mm) thick, and set in resilient channel glazing gasket.
- G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.
- H. Weld, fill, and grind components smooth.
- I. Finish of Cabinet Exterior Trim and Door: Baked enamel, color as selected.
- J. Finish of Cabinet Interior: White colored enamel.

## **2.04 ACCESSORIES**

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Extinguisher Theft Alarm: Battery operated alarm, 10 second delay for disarming, activated by opening cabinet door.
- C. Lettering: FIRE EXTINGUISHER decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify rough openings for cabinet are correctly sized and located.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Place extinguishers in cabinets.

### **3.03 MAINTENANCE**

- A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

**END OF SECTION 104400**



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## **SECTION 123600 COUNTERTOPS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Plastic laminate countertops.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 064100 - Architectural Wood Casework.

#### **1.03 REFERENCE STANDARDS**

- A. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications 2022.
- B. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.
- D. AWI (QCP) - Quality Certification Program Current Edition.
- E. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition 2014, with Errata (2016).
- F. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards 2021, with Errata.
- G. ISFA 2-01 - Classification and Standards for Solid Surfacing Material 2013.
- H. NEMA LD 3 - High-Pressure Decorative Laminates 2005.
- I. PS 1 - Structural Plywood 2009 (Revised 2019).

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Specimen warranty.
- C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections. Show all proposed seam locations on Shop Drawings.
  - 1. Show interface with adjacent work.
  - 2. Show sink cut outs and accessories.
- D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finish product specified, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
- F. Counter Edge Sample: Submit sample of edge banding applied to counter, 12 inches long.
- G. Sustainable Design Submittal: Documentation for sustainably harvested wood-based components.
- H. Test Reports: Chemical resistance testing, showing compliance with specified requirements.
- I. Installation Instructions: Manufacturer's installation instructions and recommendations.
- J. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

#### **1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than ten years of documented experience.

## **1.06 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.

## **1.07 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**

### **2.01 COUNTERTOPS, WINDOW SILLS AND WORK SURFACES**

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
- B. Plastic Laminate Countertops: High-pressure decorative laminate (HPDL) sheet bonded to substrate.
  - 1. Laminate Sheet: NEMA LD 3, Grade HGS - 107HW (High Wear), 0.048 inch (1.2 mm) nominal thickness.
    - a. Manufacturers:
    - b. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Wilsonart: [www.wilsonart.com](http://www.wilsonart.com).
      - 2) Panolam Industries International, Inc: [www.panolam.com](http://www.panolam.com).
      - 3) Wilsonart: [www.wilsonart.com/#sle](http://www.wilsonart.com/#sle).
      - 4) Substitutions: See Section 016000 - Product Requirements.
    - c. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
    - d. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
    - e. Laminate Core Color: Same as decorative surface.
    - f. Finish: Matte or suede, gloss rating of 5 to 20.
    - g. Surface Color and Pattern: As indicated on drawings.
  - 2. Exposed Edge Treatment: Molded ABS, 3mm thick edge with T-spline, sized to completely cover edge of panel.
    - a. Color: As selected by Architect from the manufacturer's full line.
  - 3. Back and End Splashes: Same material, same construction.
- C. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
  - 1. Flat Sheet Thickness: 1/2 inch (12 mm), 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) Basis-of-Design: Wilsonart; Solid Surface: [www.wilsonart.com](http://www.wilsonart.com).
      - 2) 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. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
    - d. Color and Pattern: As indicated on drawings.
  - 3. Other Components Thickness: 1/2 inch (12 mm), minimum.
  - 4. Exposed Edge Treatment: Built up to minimum 1-1/4 inch (32 mm) thick; edge profile as indicated on drawings; use marine edge at sinks.

5. Back and End Splashes: Same sheet material, square top; minimum 4 inches (102 mm) high.
  - a. Unless otherwise indicated on drawings.
6. Skirts: As indicated on drawings.
7. Window sills and work surfaces:
  - a. Same as countertops.
- D. Stainless Steel Countertops: ASTM A666, Type 304, stainless steel sheet; 14 gage, 0.0781 inch (2 mm) nominal sheet thickness.
  1. Finish: 4B satin brushed finish.
  2. Refer to details indicated on drawings.

## 2.02 MATERIALS

- A. Wood-Based Components:
  1. Wood fabricated from old growth timber is not permitted.
  2. Provide wood products made with binder containing no urea formaldehyde (NAF) or ultra-low emitting formaldehyde (ULEF).
  3. Provide sustainably harvested wood, certified or labeled as specified in Section 016000 - Product Requirements.
  4. Provide wood harvested within a 500 mile (805 km) radius of the project site, when possible.
  5. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless otherwise noted, provided it is clean and free of contamination; identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc.
- B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch (19 mm) thick; join lengths using metal splines.
- C. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
  1. Sustainable Medium Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde (NAF), MR-10, FSC certified.
    - a. Basis-of-Design: "Arreis" MDF by Roseburg.
  2. Sustainable Moisture Resistant Medium Density Fiberboard: ANSI A208.2-2009, Grade 155, made with binder containing no urea formaldehyde (NAF), MR-50, FSC certified.
    - a. Basis-of-Design: "Medex" MDF by Roseburg.
    - b. Locations: Within 10 feet of any plumbing fixture.
- D. Medium Density Particleboard:
  1. Medium Density Particleboard: ANSI 208.1, Industrial Grade M3, made with binder containing no urea formaldehyde (NAF), MR-10, FSC certified.
    - a. Basis-of-Design: "Collins Pine Free-Form" by Collins Wood.
  2. Medium Density Particleboard: ANSI 208.1, Industrial Grade M3, made with binder containing no urea formaldehyde (NAF), MR-50, FSC certified.
    - a. Basis-of-Design: "Collins Pine Free-Form MR50 Particleboard" by Collins Wood.
    - b. Locations: Within 10 feet of any plumbing fixture.
- E. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.
- F. Joint Sealant: Mildew-resistant silicone sealant, clear.

## 2.03 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 (25 mm) 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 (102 mm), unless otherwise indicated.
- C. Solid Surfacing: Fabricate tops up to 144 inches (3657 mm) long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.
- D. Stainless Steel: Fabricate tops up to 144 inches (3657 mm) long in one piece including nosings and back and end splashes; accurately fitted mechanical field joints in lengths over that dimension are permitted.
  - 1. Weld joints; grind smooth and polish to match.
  - 2. Provide stainless steel hat channel stiffeners, welded or soldered to underside, where indicated on drawings.
  - 3. Provide wall clips for support of back/end splash turndowns.
  - 4. Sound Deadening: Apply water resistant, fire resistant sound deadening mastic to entire bottom surface.
- E. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings
- F. Wall-Mounted Counter Support Brackets:
  - 1. Locations are indicated on Drawings.
    - a. If locations are not indicated and required for support, provide at 4'-0" O.C. max. spacing.
  - 2. Pre-finished steel support brackets.
    - a. Basis-of-Design: Federal Brace Freedom Hidden Countertop Bracket.  
www.federalbrace.com.
      - 1) Color: As selected by architect from manufacturer's full range of pre-finished colors.
      - 2) Sizes: As required for application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

### **3.02 PREPARATION**

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### **3.03 INSTALLATION**

- A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.
- B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch (16 mm).
- C. Attach stainless steel countertops using stainless steel fasteners and clips.
  - 1. Exposed fasteners are not allowed.
- D. Seal joint between back/end splashes and vertical surfaces.

### **3.04 TOLERANCES**

- A. Variation From Horizontal: 1/8 inch in 10 feet (3 mm in 3 m), maximum.

- B. Offset From Wall, Countertops: 1/8 inch (3 mm) maximum; 1/16 inch (1.5 mm) minimum.
- C. Field Joints: 1/8 inch (3 mm) wide, maximum.

**3.05 CLEANING**

- A. Clean countertops surfaces thoroughly.

**3.06 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 123600**

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**SECTION 129300  
SITE FURNISHINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Benches.
- B. Bike Racks.
- C. Bollards.
- D. Waste Receptacles.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 3000 - Cast-in-Place Concrete: For product footings.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; Current Edition.

**1.04 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' specifications and descriptive literature, installation instructions, and maintenance information.
- C. Shop Drawings: Provide manufacturer details for product for approval, prior to fabrication.
- D. Samples: Submit manufacturer's available colors and finishes for each material type.

**1.05 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with manufacturer's requirements.
- B. Transport, store, and handle units in an upright position, avoiding rubbing, scratching, or dragging of unit base on concrete or substrate.
- C. Remove pallet/crate strapping and wrapping upon delivery of units to site to avoid marring of surface finish, unless stored in an interior, enclosed storage space free from moisture and excessive heat.
- D. Use equipment and methods for transportation, site handling and installation as recommended by manufacturer.
- E. Storage:
  - 1. Store units off ground, preferably on a wood pallet, and in manner to prevent physical damage, including rubbing, scratching, or denting of finished surface.
  - 2. Place stored units in a singular upright position and according to manufacturer specifications.
  - 3. Store so that singular units are accessible and undamaged.
- F. Handle products with care to prevent any damage to surface finish.

**PART 2 PRODUCTS**

**2.01 BENCHES**

- A. Manufactured by: DuMor; <http://dumor.com>; or approved equal.
  - 1. Model 472-60HS-2AR
    - a. 6' steel bench, steel seat, 2 armrests
    - b. Finish as selected by Architect from manufacturer's full range.
    - c. S-2 surface mount per manufacturer's requirements.
      - 1) Mounting hardware: non-corrosive tri-groove anti-theft type; bolt cut flush with the nut.



## **2.02 BIKE RACKS**

- A. Manufactured by: DuMor; <http://dumor.com>; or approved equal.
  - 1. Model 291-00/ S-1
    - a. Powder coated bike rack for embedment mount.
    - b. Finish as selected by Architect from manufacturer's full range.
    - c. S-1 embedment mount per manufacturer's requirements.

## **2.03 BOLLARDS**

- A. Manufactured by: Iron Age Grates.; <https://www.ironagegrates.com/>; or approved equal.
  - 1. Needle Model
    - a. 34" x 4.9"
    - b. Cast Aluminum; powder coat finish.
    - c. Finish as selected by Architect from manufacturer's full range.
    - d. Embed Mount
      - 1) Anchor and install per manufacturer's requirements.

## **2.04 WASTE RECEPTACLES**

- A. Manufactured by: DuMor; <http://dumor.com>; or approved equal.
  - 1. Model 438-32
    - a. 32 gallon steel receptacle
    - b. FTO cover
    - c. Steel frame
    - d. Finish: as selected by Architect from manufacturer's full range.
    - e. Surface Mount per manufacturer's requirements.
      - 1) Mounting hardware: non-corrosive tri-groove anti-theft type; bolt cut flush with the nut.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine deliveries upon arrival at site to verify each unit is without damage.
  - 1. Replace damaged units.
- B. Verify that mounting surfaces, preinstalled anchor bolts, or other mounting devices are properly installed; and ready to receive site furnishing items.
- C. Do not begin installation until unacceptable conditions are corrected.

### **3.02 INSTALLATION**

- A. Install site furnishings in accordance with approved shop drawings, and manufacturer's installation instructions.
- B. Provide level mounting surfaces for site furnishing items.
  - 1. Set units level, plumb, square and true within allowable tolerances.

### **3.03 ADJUSTING**

- A. Adjust each system so that sectional units are in proper location and orientation.
- B. Holes cannot be added to units in the field and must be fabricated during manufacturing process, prior to finishing of units.

### **3.04 CLEANING**

- A. Clean dirt or blemishes from surface of exposed units.
- B. Wash and rinse in accordance with manufacturer's recommendations.
- C. Protect adjacent surfaces from damage due to cleaning operations.
- D. Do not use cleaning materials or processes which could alter character of exposed finishes.

**END OF SECTION 129300**



T U L S A

PUBLIC SCHOOLS

**260400**  
***Electrical Systems***

SECTION 260400 - ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Work Included: Provide Design, Engineering and Construction Documents incorporating the Owner's Guidelines and Specifications defined herein, with proper installation of materials, assemblies and equipment including, but not limited to:
  - 1. Basic Materials and Methods.
  - 2. Control-Voltage Electrical Power Cables
  - 3. Low-Voltage Electrical Power Conductors and Cables.
  - 4. Grounding and Bonding.
  - 5. Hangers and Supports.
  - 6. Raceways and Boxes.
  - 7. Handholes And Boxes for Exterior Underground Wiring.
  - 8. Sleeve-Seal Systems for Electrical Raceways
  - 9. Lighting Control Devices.
  - 10. Wiring Devices.
  - 11. Fuses.
  - 12. Enclosed Switches and Circuit Breakers.
  - 13. Interior and Exterior Lighting.
  - 14. Other items and services required to complete the systems.
- B. Drawings:
  - 1. These Design Guidelines and Specifications are accompanied by floor plans of the building showing the general location of the work. Exact locations shall be subject to the approval of the Owner who reserves the right to make any reasonable changes in locations indicated, prior to rough-in, without cost to the Owner. While the general run of feeders, branches, and conduits are indicated on the Drawings, it is not intended that the exact routing of circuits or locations of conduits be determined by Conceptual Drawings. Detailed arrangements of all Work shall be subject to the Owner's approval.
- C. Related Work:
  - 1. Documents affecting Work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
- D. Temporary Power:
  - 1. Arrange, provide and pay for the costs of installing temporary power to the site in accordance with the requirements of Division 1.

## Memorial HS Façade and Secure Entry

### 1.2 QUALITY ASSURANCE:

- A. Use adequate number of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the Work of this Section.
- B. Codes and Ordinances:
  - 1. The installation shall comply with requirements of all applicable laws, codes and ordinances including those of the state, county and city.
  - 2. NFPA 70 - 2014.
  - 3. NFPA 72 – 2015 (including FM Directives)
  - 4. NFPA 101 – 2014.
  - 5. Where these Drawings, Design Guidelines and Specifications show more stringent requirements than required codes, the more stringent shall prevail.
  - 6. The Work shall comply with current standards of the serving utility companies.
- C. Permits, Fees and Licenses:
  - 1. The Contractor shall obtain and pay for all permits, fees and licenses, for Work required under these Specifications.
- D. Utility Company Fees:
  - 1. Coordination of existing utilities and easements including fees associated with the project shall be included in the Work.
- E. Without additional cost to the Owner, provide such other labor and materials as are required to complete the Work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.

### 1.3 EXAMINATION OF SITE:

- A. Visit the site, inspect the existing conditions and check the Drawings and Specifications to be fully informed of the requirements for completion of the Work.
- B. Lack of such examination shall not justify a request for extra compensation to the Contract price.

### 1.4 MATERIAL AND EQUIPMENT:

### 1.5 SUBMITTALS:

- A. SHOP DRAWINGS AND SUBMITTAL DATA
  - 1. Process shop drawings and submittal data to ensure that the proposed materials, equipment and devices conform to the requirements of the Contract Documents, and that there are no omissions or duplications. Provide layouts, fabrication information and data for systems, materials, equipment and devices proposed for the project.

## Memorial HS Façade and Secure Entry

- a. Shop drawings shall be drawn on a scale not less than ¼ inch equals 1 foot showing actual dimensions. Shop drawings shall include, but not be limited to:
  - 1) Switchboards
  - 2) Distribution Panelboards
2. Submittal data (manufacturer's catalog data) shall include Manufacturer's Specifications, product literature and other data needed to demonstrate compliance with the specified requirements, but not be limited to the following:
  - a. Equipment: Disconnect Switches, Circuit Breakers, Fuses, etc.
  - b. Materials: conduit, conductors, connectors, supports, etc.
  - c. Lighting Fixtures and Lamps.
  - d. Wiring Devices.
  - e. Lighting Control Devices – Sensors, Dimming, etc.
  - f. Low-Voltage Data outlet devices and Cabling systems.
  - g. Low-Voltage Clock and Intercom System – (Existing).
  - h. Security and Camera Systems – (Existing)
  - i. Addressable Fire Alarm System – (Existing).
3. Manufacturer's recommended installation procedure which, when approved by the Owner, will become the basis for accepting or rejecting actual installation procedures used on the work.
4. The submittal data shall not consist of manufacturer's catalogs or cut sheets that contain no indication of the exact item offered. The submission on individual items shall designate the exact item offered.
5. Do not submit detailed quantitative listings of materials, equipment and devices. It is the Contractor's responsibility to provide proper sizes and quantities to conform to Contract Documents.
6. Assemble submittals on related items procured from a single manufacturer in brochures or other suitable package form, rather than submitting a multiplicity of loose sheets.
7. The Contractor shall submit shop drawings whenever equipment proposed varies in physical size and arrangement from that indicated thus causing rearrangement of equipment space, where tight spaces require extreme coordination between this work and other work, where called for elsewhere in these Specifications and where specifically requested by the Owner. Shop drawings shall be prepared at a scale of not less than ¼ inch equals 1 foot.

### B. SUBSTITUTIONS

1. Where a single manufacturer is mentioned by trade name or manufacturer's name, it has been done to establish a standard rather than to discriminate against an equal product made by another manufacturer.
2. Where multiple manufacturers are listed in the Owner's drawings and/or specification, none other than those manufacturers will be accepted.
3. Substitute manufacturers will be considered prior to bid only. The substitute manufacturer shall submit a complete copy of the appropriate technical specification section minimum ten (10) business days prior to bid with each subparagraph noted with the comment, "compliance", "deviation" or "alternate". In the case of non-primary, vendor-supplied items, the name of the sub-vendor supplying said item, including model number, shall be indicated.

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4. By noting the term "compliance" or "C", it shall be understood that the manufacturer is in full compliance with the item specified and will provide exactly the same with no deviations.
  5. By noting the term "deviation" or "D", it shall be understood that the manufacturer prefers to provide a different component in lieu of that specified. Manufacturer shall indicate all deviations.
  6. It shall be understood that space allocations have been made on the basis of present and known future requirements and the dimensions of items of equipment or devices of a particular manufacturer whether indicated or not. If any item of equipment or device is offered in substitution which differs substantially in dimension or configuration from that indicated on the Drawings or specifications, provide as part of the submittal ¼ inch equals 1-foot scaled drawings showing that the substitute can be installed in the space available without interfering with other portions of the work or with access for operations and maintenance in the completed project.
  7. Where substitute equipment or devices requiring different arrangement or connections from that indicated is accepted by the Owner, install the equipment or devices to operate properly and in harmony with the intent of the Contract Documents, making all incidental changes in piping, ductwork or wiring resulting from the equipment or device selection without any additional cost to the Owner. The Contractor shall pay all additional costs incurred by other portions of the work in connection with the substituted equipment or device.
  8. The Owner reserves the right to call for samples of any item of material, equipment or device offered in substitution, together with a sample of the specific item when, in their opinion, the quality of the item and/or the appearance is involved, and it is deemed that an evaluation of the item may be better made by visual inspection.
  9. When any request for a substitution of material, equipment or device is submitted and rejected, the item named in the Contract Documents shall be furnished. Repetitive submittal of substitutions for the same item will not be considered.
- C. Samples:
1. When requested by the Owner, promptly provide samples of items scheduled to be exposed in the final structure.
  2. When specifically, so requested by the Contractor and approved by the Owner, approved samples will be returned to the Contractor for installation on the Work.
- D. Record Drawings:
1. Comply with pertinent provisions of Division 1.
  2. Include a copy of the Record Drawings in each copy of the operation and maintenance manual described below.
- E. Manual:
1. Upon completion of this portion of the Work, and as a Condition of its acceptance, deliver the operation and maintenance manual to the Owner complied in accordance with the provisions of Division 1 of these specifications. Include within each manual.
    - a. Copy of the approved Record Documents for this portion of the Work.
    - b. Copy of each circuit directories.
    - c. Copy of each warranty and guaranty.

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### 1.6 GUARANTEE:

- A. The Contractor guarantees all Work against any defects due to faulty workmanship or material and that all raceways, ducts and piping are free from foreign material, obstructions, holes or breaks of any nature.
- B. Upon written notice from the Owner or Owner, the Contractor shall promptly remedy without cost to the Owner any defects occurring within a period of one (1) year from the date of final acceptance.

### 1.7 WARRANTY:

- A. The Contractor shall properly execute in the Owner's name all Manufacturers' standard warranty certificates applying to equipment installed on the project and shall deliver said certificates to the Owner at completion of the job. All warranty cards shall also be properly executed and delivered to the supplier or Manufacturer's representative for Manufacturer's records. Standard warranties for equipment shall be not less than one (1) year.

## PART 2 - PRODUCTS

### 2.1 BASIC ELECTRICAL MATERIALS AND METHODS:

- A. Provide only materials that are new and of the type and quality specified. Where Underwriter's Laboratories, Inc. have established standards for such materials, provide only materials bearing the UL label.
- B. Materials and equipment shall be new, of the same type and manufacturer, of the best quality and design, free from defects and meet the requirements of UL and NFPA where standards are established for those items and assemblies.
- C. Manufacturer's nameplate affixed in a conspicuous place will be required on each major component of equipment stating Manufacturer's name, address and catalog number.
- D. Manufacturer's name and model number used herein and, on the Drawings, establish type and quality required. Equal products may be considered if submitted in writing to the Owner's Representative for approval 10 (ten) days prior to bid date. The Contractor shall be responsible for assuring the items and equipment substituted for those shown on the Drawings will physically fit in the space allocated.
- E. Fire stopping material shall be 3M Fire Seal Caulking, or approved substitution.
- F. Terminals and enclosures shall be marked for 75° C operation or conductor size shall be increased as required at no cost to the Owner.
- G. Steel Pipe Wall Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends. Comply with NECA 1.

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- H. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work and roof manufacturer's requirements.
- I. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.
- J. Provide sleeves and chases where conduits pass through rated floors and walls, fire stopped in accordance with UL Listed assembly.
- K. When boring, cutting or drilling structural wood or wall members, drill only in locations as approved by the Owner.
- L. Immediately prior to final inspection, the Contractor shall make a final cleanup of dirt and refuse resulting from his Work and shall assist in keeping the premises clean at all times.
- M. Immediately prior to final inspection, the Contractor shall clean all material and equipment installed under this Contract. Dirt, dust, plaster, stains and foreign matter shall be removed from all surfaces. Damaged finishes shall be touched up and restored to their original Condition.
- N. Mechanism of all equipment shall be checked, adjusted and tested for proper operation. Protective devices and parts shall be checked and tested for specified and required application and adjusted as required to produce the intended performance.
- O. Service voltage and color codes for 480Y/277V: Phase A - Brown, Phase B - Orange, Phase C - Yellow, Neutral - White, and Ground - Green.
- P. Service voltage and color codes for 208/120V: Phase A - Black, Phase B - Red, Phase C - Blue, Neutral - White, and Ground - Green.

### 2.2 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS

- A. Related Requirements:
  - 1. Section 260400 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.
- B. Copper Building Wire: Flexible, insulated and uninsulated, drawn copper current-carrying conductor complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors with an overall insulation layer or jacket, or both, rated 600 V or less.
- C. Basis-of-Design Product: Subject to compliance with requirements, provide Southwire Company or comparable product by one of the following:
  - 1. Alpha Wire Company.
  - 2. Cerro Wire LLC.



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3. Encore Wire Corporation.
  4. General Cable Technologies Corporation.
  5. Southwire Company.
- D. Service Entrance Conductors:
1. For line voltages, provide 600 V THHN insulated copper wire with UL Label, listing, and color coded for voltage.
- E. Conductors:
1. For line voltages, provide 600 V insulated copper wire and cable, with UL Label, listing, and color coded for voltage.
  2. Use type THHN/THWN color coded for voltage at interior, type THHN/THWN-2 for exterior.
  3. For wire No. 10 and smaller, provide solid wire: for wire larger than No. 10, provide stranded wire.
  4. Conductors No. 8 and larger, provide insulating bushings or insulating sleeves.
  5. Use only copper wires and cables.
- F. No. 12 AWG THHN conductors and larger for all branch circuits, protected by 20-amp circuit breakers. Where so indicated on the Drawings, by actual load, or by the N.E.C., use larger wires to limit voltage drops:
1. Increase wire sizes to next largest AWG size for:
    - a. 120-volt circuits exceeding 150 feet in circuit length.
    - b. 208-volt circuits exceeding 200 feet in circuit length.
  2. Wire and conduit sizes shall be increased for the above conditions whether shown on the Drawings or not.
- G. Use identified (white) neutrals and colored-coded phase wires for all branch circuit wiring.
- H. Make splices electrically and mechanically secure with pressure-type. Push-in connectors shall not be allowed.
1. For wires size 10 AWG and smaller, provide NSI twist-on connectors.
  2. For wires size 8 AWG and larger, provide NSI Polaris insulated connectors.
- I. Tape all joints with rubber tape 1-1/2 times the thickness of the conductor insulation, then cover with the friction tape or the vinyl-plastic electrical tape specified above.

### 2.3 LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

- A. Related Requirements:
1. [Section 260400 "Control-Voltage Electrical Power Cables" for control systems communications cables and Classes 1, 2, and 3 control cables.](#)
- B. Copper Building Wire: Flexible, insulated and uninsulated, drawn copper current-carrying conductor complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors with an overall insulation layer or jacket, or both, rated 600 V or less.

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- C. Basis-of-Design Product: Subject to compliance with requirements, provide Southwire Company or comparable product by one of the following:
  - 1. Alpha Wire Company.
  - 2. Cerro Wire LLC.
  - 3. Encore Wire Corporation.
  - 4. General Cable Technologies Corporation.
  - 5. Southwire Company.
- D. Conductors:
  - 1. For line voltages, provide 600 V insulated copper wire and cable, with UL Label, listing, and color coded for voltage.
  - 2. Use type THHN/THWN color coded for voltage at interior, type THHN/THWN-2 for exterior.
  - 3. For wire No. 10 and smaller, provide solid wire: for wire larger than No. 10, provide stranded wire.
  - 4. Conductors No. 8 and larger, provide insulating bushings or insulating sleeves.
  - 5. Use only copper wires and cables.
- E. No. 12 AWG THHN conductors and larger for all branch circuits, protected by 20-amp circuit breakers. Where so indicated on the Drawings, by actual load, or by the N.E.C., use larger wires to limit voltage drops:
  - 1. Increase wire sizes to next largest AWG size for:
    - a. 120-volt circuits exceeding 150 feet in circuit length.
    - b. 208-volt circuits exceeding 200 feet in circuit length.
  - 2. Wire and conduit sizes shall be increased for the above conditions whether shown on the Drawings or not.
- F. Use identified (white) neutrals and colored-coded phase wires for all branch circuit wiring.
- G. Make splices electrically and mechanically secure with pressure-type. Push-in connectors shall not be allowed.
  - 1. For wires size 10 AWG and smaller, provide NSI twist-on connectors.
  - 2. For wires size 8 AWG and larger, provide NSI Polaris insulated connectors.
- H. Tape all joints with rubber tape 1-1/2 times the thickness of the conductor insulation, then cover with the friction tape or the vinyl-plastic electrical tape specified above.

## 2.4 GROUNDING AND BONDING

- A. Submittals:
  - 1. Product Data: For each type of product.
  - 2. Product Schedule: Indicate type, use, location, and termination locations.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Burndy; Part of Hubbell Electrical Systems.
  - 2. ERICO International Corporation.

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3. TE Connectivity Ltd.
  4. ILSCO.
  5. O-Z/Gedney; a brand of Emerson Industrial Automation.
- C. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- D. Bare Copper Conductors:
1. Stranded Conductors: ASTM B 8.
  2. Tinned Conductors: ASTM B 33.
  3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
  4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  5. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
- E. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches in cross section, with 9/32-inch holes spaced 1-1/8 inches apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.
- F. Connectors: Listed and labeled by an NRTL as complying with NFPA 70, acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 467.
1. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
  2. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
  3. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
  4. Cable-to-Cable Connectors: Compression type, copper or electroplated tinned copper, C and H shaped.
  5. Cable Tray Ground Clamp: Mechanical type, zinc-plated malleable iron.
  6. Conduit Hubs: Mechanical type, terminal with threaded hub.
  7. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
  8. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.
  9. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.
  10. Straps: Solid copper, cast-bronze clamp. Rated for 600 A.
  11. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
  12. Water Pipe Clamps: Tin-plated aluminum or Silicon Bronze. Mechanical type, two pieces with zinc-plated bolts.
- G. Provide exothermic connections with Erico/Cadweld or approved substitutes.
- H. Ground Rods: Copper-clad steel, sectional type; 5/8 by 96 inches.

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- I. Bond all water piping systems per local codes. Do not bond to gas piping systems within the building.

### 2.5 HANGERS AND SUPPORTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
  - 1. Material: Pre-galvanized steel.
  - 2. Channel Width: 1-5/8 inches.
  - 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
  - 4. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- E. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. B-line, an Eaton business.
    - b. Empire Tool and Manufacturing Co., Inc.
    - c. Hilti, Inc.
    - d. MKT Fastening, LLC.
  - 2. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
  - 3. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
  - 4. Toggle Bolts: All-steel springhead type.
  - 5. Hanger Rods: Threaded steel.
- F. Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- G. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter. Wire-ties and zip-ties shall not be an acceptable means of support to structure(s).
- H. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

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- I. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.
- J. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.
  - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  - 4. To Existing Concrete: Expansion anchor fasteners.
  - 5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
  - 6. To Light Steel: Sheet metal screws.
  - 7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- K. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- L. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

### 2.6 RACEWAYS AND BOXES

- A. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use. Conduit Fittings for Hazardous (Classified) Locations: UL 1203.
- B. Raceways and Fittings:
  - 1. Steel Electrical Intermediate Metal Conduit (IMC) - UL 1242 and UL Category Control Number DYBY: Exterior - Zinc coated; Interior - Zinc with organic top coated. Fittings: Steel, compression coupling.
  - 2. Steel Electrical Metal Tubing (EMT) and Elbows: UL 797 and UL Category Control Number FJMX: Exterior - Zinc coated; Interior - Zinc with organic top coated. Fittings: Steel, compression coupling.
  - 3. Aluminum Electrical Metal Tubing (EMT) and Elbows: UL 797A and UL Category Control Number FJMX: Exterior - Zinc coated; Interior - Zinc with organic top coated. Fittings: Steel, compression coupling.
  - 4. Flexible Metal Conduit (FMC): [Steel\\_Aluminum](#). UL 1 and UL Category Control Number DXUZ. Fitting: UL 514B and UL Category Control Number ILNR.

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5. Liquidtight Flexible Metal Conduit (LFMC): [Steel\\_Aluminum](#). UL 360 and UL Category Control Number DXHR. UL 514B and UL Category Control Number DXAS.
  6. Schedule 40 Rigid PVC Conduit (PVC-40) and Fittings: UL 651 and UL Category Control Number DZYR. For use with maximum 90 deg C wire.
  7. Minimum raceway size: 3/4" raceway for power circuits and 1" raceways for low-voltage communication cable raceways.
- C. [Surface mounted raceways: Wiremold or Owner approved equal, steel 500 or 700 Series with matching surface mount box and mounting accessories. Color as directed by Owner. EMT conduit is not an allowable method for surface raceways. Submit to Owner prior to installation.](#)
- D. [Surface mounted raceways on existing walls: 3/4" EMT maximum. Provide 1/2" EMT raceways for thermostat, HVAC sensors and control circuits anchored to wall system by approved method.](#)
- E. Boxes, Enclosures and Cabinets:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Crouse-Hinds, an Eaton business.
    - b. Hubbell Incorporated.
    - c. RACO; Hubbell.
    - d. Thomas & Betts Corporation; A Member of the ABB Group.
    - e. Wiremold / Legrand.
  2. General Requirements for Boxes, Enclosures, and Cabinets: Comply with NFPA 70 for intended location and use. UL 514A and UL CCN QCIT.
  3. Wireways and Auxiliary Gutters:
    - a. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system. Manufacturer's standard enamel finish.
    - b. Wireway Covers: Hinged, Screw-cover and Flanged-gasketed as indicated in drawings.
  4. Metallic Outlet, Device Boxes, Rings, Covers and Conduit Bodies:
    - a. Description: 4" square outlet box having pryout openings, knockouts, threaded entries, or hubs in either the sides of the back, or both, for entrance of conduit, conduit or cable fittings, or cables, with provisions for mounting outlet box cover, but without provisions for mounting wiring device directly to box.
    - b. Material: Sheet steel and Cast metal.
    - c. Sheet Metal Depth: 2-1/8" deep minimum to accommodate 1" knockout.
    - d. Cast-Metal Depth: 2.4 inch deep.
    - e. Luminaire Outlet Boxes and Covers: Nonadjustable, listed and labeled for attachment of luminaire weighing 50 lb.
    - f. Paddle Fan and Large Luminaire Outlet Boxes and Covers: Nonadjustable, designed for attachment of paddle fan weighing up to 70 lb.
    - g. Conduit Bodies: Means for providing access to interior of conduit or tubing system through one or more removable covers at junction or terminal point.

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5. Metallic Floor Boxes and Floor Box Covers: RFB4 series with (4) independent compartments, stamped steel, and shallow steel for concrete 2 7/16" depths accepting 3/4" and 1" conduit.
    - a. Coverplates shall be scrub-proof with carpet in-lay and easy open handle. Activate all compartments with specified and approved wiring devices.
  6. Nonmetallic Outlet, Conduit Bodies and Device Boxes: UL 514C and UL CCN QCMZ.
- F. Termination Boxes: UL 1773 and UL Category Control Number XCKT.
1. Description: Enclosure for termination base consisting of lengths of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors or both.
  2. Listed and labeled for installation on line or load side of service equipment.
- G. Cabinets, Cutout Boxes, Junction Boxes and Pull Boxes: UL 50 and 50E.
1. Sheet Metal Cabinets:
    - a. Description: Enclosure provided with frame, mat, or trim in which swinging door or doors are or can be hung. UL Category Control Number CYIV.
  2. Sheet Metal Cutout Boxes:
    - a. Description: Enclosure that has swinging doors or covers secured directly to and telescoping with walls of enclosure.
  3. Sheet Metal, Cast-Metal, and Polymeric Junction and Pull Boxes:
    - a. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable. UL Category Control Number BGUZ.
- H. Cover Plates for Devices Boxes: UL 514D and UL Category Control Numbers QCIT and QCMZ.
1. Wallplate-Securing Screws: Metal with head color to match wallplate finish.
  2. Cover Plates for Device Boxes:
    - a. Damp and Wet Locations: Listed, labeled, and marked for location and use. Provide gaskets and accessories necessary for compliance with listing.
    - b. Metallic Wallplate Material: 0.032-inch-thick Type 302/304 non-magnetic stainless steel with brushed finish.
    - c. Metallic Wallplate Material: Steel with white baked enamel, suitable for field painting.
    - d. Metallic Wallplate Material: Galvanized steel.
    - e. Metallic Wallplate Material: As indicated on architectural Drawings.
    - f. Nonmetallic Wallplate Material: 0.060 inch thick high-impact thermoplastic (nylon) with smooth finish and color matching wiring device.
    - g. Color: As indicated on architectural drawings or selected by Owner/Architect.
  3. Hoods for Outlet Boxes:
    - a. Reference Standards:
      - 1) UL 514D and UL Category Control Numbers QCIT and QCMZ.
      - 2) Receptacle, hood, cover plate, gaskets, and seals comply with UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.
    - b. Mounts to box using fasteners different from wiring device.
  4. provide galvanized code-gauge sheet steel units with screwed-on covers, of size and shape required to accommodate wires without crowding, and to suit the

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- location. Mark with permanent ink circuit designations on cover plate. If box is to be painted provide permanent ink marking on inside of box cover.
5. For exterior pull boxes, provide fiberglass quazite box with sealed lid identified "ELECTRICAL" at size required to accommodate wires at 40% fill.
  6. Provide sleeves and chases where conduits pass through floors and walls, fire-stopped in accordance with NEC Article 300.21.
  7. For switches and receptacles, provide standard ganged switch boxes with plastic or stainless-steel covers as required by Architect; except for exposed Work, provide pressed steel boxes with galvanized or cadmium plated steel covers.
    - a. For telephone/communication outlets, provide 4" square boxes with single device cover. Route conduit to accessible ceiling cavity with end bushings and nylon pullstring.
- I. Junction boxes may not be installed back-to-back in walls and partitions. Consult with Owner for proper separation of boxes (typically, 12" in non-rated walls, 24" in rated walls).
- J. Securely and rigidly support boxes to super structure throughout the Work.

### 2.7 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:
1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
  2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Armorcast Products Company.
    - b. NewBasis.
    - c. Oldcastle Enclosure Solutions.
    - d. Quazite: Hubbell Power Systems, Inc.
  2. Standard: Comply with SCTE 77.
  3. Configuration: Designed for flush burial with open bottom unless otherwise indicated.
  4. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
  5. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
  6. Cover Legend: Molded lettering, "ELECTRIC" or "COMMUNICATIONS".
  7. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
  8. Handholes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.



2.8 SLEEVE-SEAL SYSTEMS FOR ELECTRICAL RACEWAYS

- A. Wall Sleeves:
  - 1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.
  - 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.
- C. Sleeves for Rectangular Openings:
  - 1. Material: Galvanized sheet steel.
  - 2. Minimum Metal Thickness:
    - a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
    - b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.
- D. SLEEVE-SEAL SYSTEMS
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    - a. Advance Products & Systems, Inc.
    - b. CALPICO, Inc.
    - c. Metraflex Company (The).
  - 2. Sealing Elements: EPDM rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
  - 3. Pressure Plates: Carbon steel.
  - 4. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.
- E. SLEEVE-SEAL FITTINGS
  - 1. Description: Manufactured plastic, sleeve-type, waterstop assembly made for embedding in concrete slab or wall. Unit shall have plastic or rubber waterstop collar with center opening to match piping OD.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      - 1) HOLDRITE.
      - 2) Presealed Systems.
- F. GROUT
  - 1. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.
  - 2. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
  - 3. Design Mix: 5000-psi, 28-day compressive strength.

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### G. SILICONE SEALANTS

1. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below.
  - a. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces that are not fire rated.
2. A Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

## 2.9 LIGHTING CONTROL DEVICES:

### A. Occupancy Sensors and Presence Detection:

1. Ceiling mounted in Classrooms: STEINEL: 64470 IR QUATTRO HD COM2-24.
2. Ceiling mounted in Corridors: STEINEL: 64560 US HALLWAY COM2-24.
3. Ceiling mounted in Restrooms: STEINEL: 64700 DT QUATTRO COM1-24.
4. Manufacturer part numbers change and must be verified prior to work.

### B. Wall Dimmers/Occupancy/Vacancy Sensors:

1. LEVITON: DS710-10Z, Locations may vary, final by Owner.

### C. Photocells: Integral with egress exterior fixtures.

### D. Provide and install time clocks for automatic operation of lighting and equipment loads in accordance with the Time Clock Schedule shown on the Drawings, and as follows:

1. Equipment Control:
  - a. Tork W-220-L, SPST, reserve power, 40 AMP contacts, NEMA 1 surface mounted enclosure.
  - b. Lighting Control:
    - 1) Tork 7200ZL, DPST, reserve power, 40 AMP contacts, astronomic dial, NEMA 1 surface mounted enclosure.
  - c. Photocell:
    - 1) Tork 2101, SPST, 2000 Watt rating, 120 Volt.

## 2.10 WIRING DEVICES:

### A. UL Listed and labeled as defined in NFPA 70.

### B. Color of wiring devices shall match existing facility devices or per Owner's requirements. Color of isolated ground receptacles to be orange. Coordinate with Architect/Owner for final color of all devices.

### C. Duplex Convenience Receptacles: 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

### D. Twist-Locking Receptacles: Twist-Lock, Single Convenience Receptacles: 125 V, 20 A; comply with NEMA WD 1, NEMA WD 6 Configuration Heavy-duty, NEMA 5-20R, and UL 498.

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- E. GFCI Receptacles: 125 V, 20 A, straight blade, 20 A feed-through type. Comply with NEMA WD 1, Heavy-duty NEMA 5-20R, UL CCN KCXX, UL 498, UL 943 Class A, and FS W-C-596.
  - 1. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
  - 2. Self-testing technology with indicators including disconnecting power if damaged.
  - 3. Receptacles shall be side wired feed-thru.
- F. Tamper-Resistant Duplex Straight-Blade Receptacle: 125 V, 20 A: Comply with NFPA 70, Heavy-duty NEMA 5-20R, UL CCN RTRT and UL 498, and FS W-C-596.
- G. Tamper-Resistant Duplex Straight-Blade Receptacle with USB Outlet to Power Class 2 Equipment: 125 V, 20 A: Comply with NFPA 70, Heavy-duty NEMA 5-20R, UL CCN RTRT and UL 498, and FS W-C-596.
- H. Duplex Straight-Blade Receptacle with Type 3 Surge Protective Device: 125 V, 20 A: Comply with color BLUE per NEMA WD 1, heavy-duty. Configuration NEMA 5-20R, UL 498, and FS W-C-596.
- I. Pendant Cord-Connector Devices:
  - 1. Matching, locking type plug and receptacle body connector.
  - 2. NEMA WD 6 Configurations L5-20P and L5-20R, heavy-duty grade, and FS W-C-596.
  - 3. Body: Nylon, with screw-open, cable-gripping jaws and provision for attaching external cable grip.
  - 4. External Cable Grip: Woven wire-mesh type made of high-strength, galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.
- J. Cord And Plug Sets:
  - 1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.
  - 2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
  - 3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.
- K. Toggle Switches: Comply with NEMA WD 1, UL 20, and FS W-S-896. Commercial-industrial type, 20 amp, 120/277 V AC, from the following:
  - 1. Single Pole:
    - a. Cooper; AH1221.
    - b. Hubbell; HBL1221.
    - c. Leviton; 1221-2.
    - d. Pass & Seymour; CSB20AC1.
  - 2. Two Pole:
    - a. Cooper; AH1222.
    - b. Hubbell; HBL1222.
    - c. Leviton; 1222-2.
    - d. Pass & Seymour; CSB20AC2.

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3. Three Way:
  - a. Cooper; AH1223.
  - b. Hubbell; HBL1223.
  - c. Leviton; 1223-2.
  - d. Pass & Seymour; CSB20AC3.
4. Four Way:
  - a. Cooper; AH1224.
  - b. Hubbell; HBL1224.
  - c. Leviton; 1224-2.
  - d. Pass & Seymour; CSB20AC4.
- L. Cover plates for flush mounted receptacles and switches:
  1. Mechanical, utility, kitchen and Exterior: provide 0.040" stainless steel cover plates in all areas and all devices.
  2. Office and classroom areas: Provide 0.040" stainless steel cover plates. Plastic cover plates matching the wiring devices specified for millwork.
  3. Where wiring devices are grouped, set in gangs with one cover plate.
  4. Where wiring devices are noted to be weatherproof, provide cast cover, gasketed & hinged, while-in-use rated and lockable cover.
  5. Use jumbo size plates, 302 stainless steel for outlets installed in masonry walls or as specified by Owner and existing facility standard installation.
- M. Manual motor starter: Square D "Class 2510" for 120V, 1ph motors.
- N. Communication Outlets:
  1. CommScope is Owner Standardized Equipment.
  2. Terminate each data outlet listed in drawings with one blue CommScope Cat 6 snap in jack. Use the TIA/EIA T568-A/B termination method. Provide blanks as necessary to fill all unused positions of the outlet. Snap-in jacks to accommodate UTP, fiber optic, and coaxial connectors were indicated on drawings.
  3. Surface Mounted Data Outlets: Provide raceway #LD10E16-A to metal junction box #JBX3510EI-A. Color by Owner.

### 2.11 FUSES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Bussmann, an Eaton business.
  2. Edison; a brand of Bussmann by Eaton.
  3. Littelfuse, Inc
- B. CARTRIDGE FUSES
  1. Characteristics: NEMA FU 1, current-limiting, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.
    - a. Type RK-1: 600-V, zero- to 600-A rating, 200 kAIC, time delay.
    - b. Type RK-5: 600-V, zero- to 600-A rating, 200 kAIC, time delay.
    - c. Type CC: 600-V, zero- to 30-A rating, 200 kAIC, fast acting, time delay.
    - d. Type J: 600-V, zero- to 600-A rating, 200 kAIC, time delay.

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2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Comply with NEMA FU 1 for cartridge fuses.
4. Comply with NFPA 70.
5. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

### 2.12 ENCLOSED SWITCHES AND CIRCUIT BREAKERS:

- A. Provide safety and fused switches, horsepower rated, quick-make and quick-break design, externally operated with provision for padlocking in "OFF" position, fusible or non-fusible as shown on the Drawings. Cartridge to accommodate Class R fuses.
- B. Provide enclosures clearly marked for maximum voltage, current, and horsepower rating, and:
  1. Indoor: General Duty, NEMA Type 1
  2. Outdoor: Heavy Duty, NEMA Type 3R, Rain-tight
  3. Kitchen Wash-down areas: Heavy Duty, NEMA Type 4x
- C. For switches having dual ratings (higher rating when used with dual-element fuses), provide ratings indicated on a metal plate riveted or otherwise, or permanently fastened to the enclosure.
- D. For switches serving equipment with multiple motors, switches shall be fused as indicated on the equipment nameplate.

### 2.13 INTERIOR AND EXTERIOR LIGHTING FIXTURES:

- A. LED TROFFER - MANUFACTURERS
  1. Pre-Approved Manufacturers Listed: Products of firms regularly engaged in the manufacture of recessed LED lighting fixtures of types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years. The manufacturer of the lighting fixtures shall comply with the provisions of the appropriate code and standards. All fixtures shall be pretested before shipping. Provisions for a single fixture shipped to the project site shall become property of the Owner to test and evaluate the construction meets or exceeds the original fixture approved by the Owner and listed in the fixture schedule.
  2. Conformance: Fixtures shall be manufactured in strict accordance with the Contract Drawings and Specifications.
  3. Codes: Materials and installation shall be in accordance with the latest revision of the National Electrical Code and any applicable Federal, State, and local codes and regulations.
  4. UL or CSA US Listing: All fixtures shall be manufactured in strict accordance with the appropriate and current requirements of the "Standards for Safety" to UL 8750 or others as they may be applicable. A listing shall be provided for each fixture type, and the appropriate label or labels shall be affixed to each fixture in a position concealing it from normal view.

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5. Luminaire Flat Panel Edge Lit shall be DLC Premium Certified (Design Lights Consortium).
6. Specifications and scale drawings are intended to convey the salient features, function and character of the fixtures only, and do not undertake to illustrate or set forth every item or detail necessary for the work.
7. Base Bid Manufacturers: Are listed on fixture schedule and specification. Manufacturers listed without accompanying catalog numbers are responsible for meeting the quality standards and photometric distribution set by the specified product.
8. Alternate Manufacturers: Identification by means of manufacturers names and catalog numbers is to establish basic features, quality and performance standards. Any substitutions must meet or exceed these standards. The three listed manufacturers are pre-approved Owner's standard fixtures and substitution request may not be allowed prior to bid.

### B. LED LUMINAIRE SOURCE REQUIREMENTS

1. LED's shall be manufactured by, Nichia, Cree, Samsung or Osram.
2. Lumen Output – minimum initial lumen output of the luminaire shall be as follows for the lumens exiting the luminaire in the 0-90-degree zone - as measured by IESNA Standard LM-79-08 in an accredited lab. Exact tested lumen output shall be clearly noted on the shop drawings.
3. Type 2x4: 40 Watt, Efficacy (lm/W) >123 @ 5000K for ceilings up to 10'-0".
4. Type 2x4: 48 Watt, Efficacy (lm/W) >124 @ 5000K for ceilings 10'-1" to 12'-0".
5. Type 2x2: 30 Watt, Efficacy (lm/W) >121 @ 5000K for ceilings up to 10'-0".
6. Type 2x2: 40 Watt, Efficacy (lm/W) >119 @ 5000K for ceilings 10'-1" to 12'-0".
7. 4-Ft Strip: 45 Watt, Efficacy (lm/W) >128 @ 5000K.
8. Recessed Fixtures: Comply with NEMA LE 4.
9. Provide adjustable Kelvin Rating drivers for fixtures located in Special Education Classrooms. Provide manufacturer specified wall switch.
10. Rated lamp life of 50,000 hours. Lumen output shall not decrease by more than 20% over the minimum operational life of 50,000 hours.
11. Individual LEDs shall be connected such that a catastrophic loss or the failure of one LED will not result in the loss of the entire luminaire.
12. LED Boards shall be suitable for field maintenance or replacement with plug-in connectors at power supply/drive.
13. Light Color/Quality:
14. Correlated Color temperature (CCT) range as per specification, luminaire sources and 5000K shall be correlated to chromaticity as defined by the absolute (X, Y) coordinates on the 2- D CIE chromaticity chart.
15. The color rendition index (CRI) shall be 82 or greater.
16. Chromaticity shift over 6,000 hours shall be <0.007 change in delta-u'v' average as demonstrated data set in IESNA LM-80-08 report.
17. Lumen Maintenance Factor: >0.84 at 25°C, 50,000 hours and reported in TM-21 L70 Lifetime >60,000 hours.
18. Binning: Per ANSI, 3-step MacAdam ellipse with abilities to produce uniform color across copious quantities of fixtures.

### C. LED LUMINAIRE POWER SUPPLY AND DRIVE REQUIREMENTS

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1. Driver: Instant start. 120 – 277 Volt, UL Listed, CSA Certified, Sound Rated A+. Driver shall be > 85% efficient at full load across all input voltages. Input wires shall be 18AWG solid copper minimum.
2. Flat Panel Edge-lit LED: The electronics/power supply enclosure shall be external to the SSL luminaire and be accessible per UL requirements.
3. Dimming: Driver shall be suitable for full-range dimming. The luminaire shall be capable of continuous dimming without perceivable flicker over a range of 100% to 5% of rated lumen output with a smooth shut off function. Dimming shall be controlled by a 0-10V signal. Signal wires shall be 22 AWG solid copper minimum.
4. Compatible with Leviton dimming device(s): DS710-10Z or equal.
5. Electrical Characteristics:
6. Power Factor: >0.93.
7. Input Power: 120-277V, 50/60 Hz.
8. Total Harmonic Distortion (THD): <20%.
9. The surge protection which resides within the driver shall protect the luminaire from damage and failure for transient voltages and currents as defined in ANSI/IEEE C64.41 2002 for Location Category A, where failure does not mean a momentary loss of light during the transient event.
10. Material Usage: Drivers shall be (ROHS)-compliant.
11. Warranty: Five (5) years.

### D. LED FLAT PANEL CONSTRUCTION

1. Frame: LED strips mounted on edges enclosed in solid extruded aluminum frame, painted after formed with UV-stabilized acrylic optical lens with a full aluminum back. Construction seals conditioned air from the plenum or non-conditioned air. Housing shall be designed rigid to eliminate warping or bending for level installation. Frame corners conformed for seamless appearance.
2. Optical Lens/Diffusers:
3. Acrylic: One hundred percent virgin UV-stabilized acrylic (PMMA) optical panel, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
4. Each luminaire shall consist of an assembly that utilizes LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply) and integral controls as per this specification.
5. Each luminaire shall be designed to operate at an average operating temperature - 4°F to 104°F.
6. Humidity: 20% – 85% RH, Lighting Facts.
7. Luminaire housing to have no visible welding, screws, springs, hooks, rivets, bare LED's or plastic supports in viewing angles at floor to ceiling placement.
8. The luminaire shall be a single, self-contained device, not requiring on-site assembly for installation. The power supply and circuit board for the luminaire shall be fundamental to the unit.
9. Driver disconnect shall be provided where required to comply with codes.
10. Finish: Polyester white powder coat painted with 92% high-reflective paint after fabrication.
11. Integral Grid Clips required on recessed mounted luminaires along with integral tie wire mounting points. Compatible with standard 15/16" and 9/16" T-Bar ceilings.
12. Luminaire to have air removal capability where specified.

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13. Any questions shall be directed to Randy Ramsey in the Bond office of TPS. Office: 918-746-6131 or E-mail: ramsera@tulsaschools.org
14. NOTE: As new technologies become available this specification will be changed. Do not assume you have the latest spec, ask for the most recent revised specification from Tulsa Public Schools bond office.

### E. RECESSED LED DOWNLIGHTS

1. An approved manufacturer same as LED troffers or equal. 4000K minimum.
2. Housing finish to be white unless otherwise specified
3. Must be able to accept an actual lensed R-30 LED, with Edison medium base.

### F. EXIT SIGNS:

1. Comply with LM80 and with authorities having jurisdiction for sign colors and lettering size, and with be LED illuminated
2. Internally Lighted Signs: As follows:
3. Lamps for AC Operations: Light-emitting diodes, 50,000 hours minimum rated lamp life
4. Self-Powered Exit Signs (Battery Type)” Integral automatic charger in a self-contained power pack.
5. Battery: Sealed, maintenance-free, nickel-cadmium type with special warranty
6. Charger: Fully automatic, solid-state type with sealed transfer relay.
7. Operation: Relay automatically energizes lamp from unit when circuit voltage drops to 80 percent of nominal or below. When normal voltage is restored, relay disconnects lamps, and battery is automatically recharged and floated on charger.

### G. EMERGENCY LIGHTING UNITS:

1. Self-contained units Comply with UL 924/LM 80. Units include the following features:
  - a. Battery: Sealed, maintenance-free nickel - cadmium type with minimum 10-year nominal life and special warranty.
  - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
  - c. Operation: Relay automatically turns lamp on when supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level when normal voltage is restored, relay disconnects lamps and batter is automatically recharged and floated on charger.

### H. EMERGENCY LED POWER SUPPLY UNIT:

1. Self-contained, modular, battery-inverter unit factory mounted within fixture body-comply with UL 924/LM 80.
2. Test Switch and light-emitting diode indicate light: Visible and accessible without opening fixture or entering ceiling space.
3. Battery: Sealed, maintenance-free, nickel-cadmium type with minimum 10-year nominal life.
4. Charger: Fully automatic, solid-state, constant-current type.
5. Operation: Relay automatically energizes lamp from unit when normal supply circuit voltage drops to 80 percent of nominal voltage or below. When normal



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voltage is restored, relay disconnects lamp, and battery is automatically recharged and floated on charger.

6. Do not support from sub-purlins of panelized roof systems.

### PART 3 - EXECUTION

#### 3.1 ELECTRICAL SITE COORDINATION AND PREPARATION

- A. Examine the areas and the Conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of this work. Do not proceed until unsatisfactory conditions are corrected.
- B. Coordinate with local utility company temporary and permanent power requirements for the project. Provide a request for all utilities to be located and marked at project site prior to the start of Work. Prepare site easements for saw-cutting, trenching and backfill. Coordinate power outages with Owner and utility company 10-days prior to outage.
- C. Coordination with Division Trades:
  1. Coordinate as necessary with other trades to assure proper and adequate provision in this Work of those trades for interface with the Work of this Section.
  2. Coordinate the installation of electrical items with the schedule for Work of other trades to prevent unnecessary delays in the total Work.
  3. Where lighting fixtures and other electrical items are shown in conflict with locations of structural members and mechanical or other equipment, provide required supports and wiring to clear the encroachment.
  4. Provide 110-volt temperature control, control transformers in enclosures and interlock wiring. Coordinate all requirements with mechanical contractor prior to rough-in and installation.
  5. Provide weatherproof ground-fault receptacles within 25'-0" of devices and equipment to be readily-accessible for maintenance.
- D. Coordinate arrangement, mounting and support of electrical equipment:
  1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
  2. Provide for ease of disconnecting the equipment with minimum interference to other equipment installations.
  3. Allow right-of-way for piping and conduit installed at required slope.
  4. Connecting raceways, cables, wireways, cable trays and busways to be clear of obstructions and allow working clearances of other equipment.
- E. Where outlets are not specifically located on the Drawings, locate as determined in the field by the Architect. Where outlets are installed without such specific direction, relocate as directed by the Architect and at no additional cost to the Owner.
- F. The Electrical Drawings are diagrammatic but are required to be followed as closely as actual construction and Work of other trades will permit. Where deviations are required to conform with actual construction and the Work of other trades, make such deviations without additional cost to the Owner.

### 3.2 INSTALLATION OF CONTROL-VOLTAGE ELECTRICAL POWER CABLES

- A. Comply with requirements in Section 260400 "Raceways and Boxes for Electrical Systems" for raceway selection and installation requirements for boxes, conduits, and wireways as supplemented or modified in this Section.
  - 1. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep.
  - 2. Outlet boxes for optical-fiber cables shall be no smaller than 4 inches square by 2-1/8 inches deep with extension ring sized to bring edge of ring to within 1/8 inch of the finished wall surface.
  - 3. Flexible metal conduit shall not be used.
- B. Comply with TIA-569-C for pull-box sizing and length of conduit and number of bends between pull points.
- C. Install manufactured conduit sweeps and long-radius elbows if possible.
- D. Raceway Installation in Equipment Rooms:
  - 1. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed, or in the corner of the room if multiple sheets of plywood are installed around perimeter walls of the room.
  - 2. Secure conduits to backboard if entering the room from overhead.
  - 3. Extend conduits 3 inches above finished floor.
  - 4. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- E. General Requirements for Cabling:
  - 1. Comply with TIA-568-C Series of standards and BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems".
  - 2. Cables may not be spliced.
  - 3. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
  - 4. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIMM, Ch. 5, "Copper Structured Cabling Systems." Install lacing bars and distribution spools.
  - 5. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
  - 6. Support: Do not allow cables to lay on removable ceiling tiles.
  - 7. Secure: Fasten securely in place with hardware specifically designed and installed to not damage cables.
- F. Installation of Control-Circuit Conductors:
  - 1. Install wiring in raceways. Comply with requirements specified in Section 260400 "Raceways and Boxes for Electrical Systems."
- G. Open-Cable Installation:
  - 1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.

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2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches above ceilings by cable supports not more than 30 inches apart.
  3. Cable shall not be run through or on structural members or in contact with pipes, ducts, or other potentially damaging items. Do not run cables between structural members and corrugated panels.
- H. Installation of Cable Routed Exposed under Raised Floors:
1. Install plenum-rated cable only.
  2. Install cabling after the flooring system has been installed in raised floor areas.
  3. Below each feed point, neatly coil a minimum of 72 inches of cable in a coil not less than 12 inches in diameter.
- I. Minimum Control-Circuit Conductor Sizes:
1. Class 1 remote-control and signal circuits; No 14 AWG.
  2. Class 2 low-energy, remote-control, and signal circuits; No. 16 AWG.
  3. Class 3 low-energy, remote-control, alarm, and signal circuits; No 12 AWG.
- J. Identification: Identify data and communications system components, wiring, and cabling according to TIA-606-A; label printers shall use label stocks, laminating adhesives, and inks complying with UL 969.
- ### 3.3 INSTALLATION OF LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS
- A. Conductor Material Applications:
1. Feeders: Copper for feeders smaller than No. 250 MCM; copper or aluminum for feeders No. 250 MCM and larger. Conductors shall be solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger. Adjust raceway sizes accordingly where use of aluminum material is allowed.
  2. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
  3. Power-Limited Fire Alarm and Control: Solid for No. 12 AWG and smaller.
- B. Conductor Insulation and Multiconductor Cable Applications and Wiring Methods:
1. Service Entrance: Type THHN/THWN-2, single conductors in raceway.
  2. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.
  3. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, single conductors in raceway.
  4. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway.
  5. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.
  6. Branch Circuits Concealed in Millwork and Wall Partitions: Metal-clad cable, Type MC.
  7. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN/THWN-2, single conductors in raceway.
- C. Installation of Conductors and Cables:
1. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

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2. Complete raceway installation between conductor and cable termination points according to Section 260400 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
  3. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
  4. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
  5. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
  6. Support cables according to Section 260400 "Hangers and Supports for Electrical Systems."
- D. Connections:
1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
  2. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.
- E. Identification: Identify and color-code conductors and cables according to NFPA 70. Identify each spare conductor at each end with identity number and location of other end of conductor and identify as spare conductor.
- F. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- G. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260400 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."
- H. Other Requirements:
1. Conductors No. 4 and larger, provide insulating bushings or insulating sleeves.
  2. Provide barriers in boxes where different voltages and conductor insulation exist.
  3. Install control wiring for equipment or as required by other Division Trade Work.
  4. Tape all joints with rubber tape 1-1/2 times the thickness of the conductor insulation, then cover with a minimum of two half-lapped layers of Scotch Brand No. 33 vinyl-plastic electrical tape.
  5. Provide expansion fittings in conduits which are non-continuous and exposed to the weather.
- I. Wire Sizes:
1. Increase wire sizes and raceway to next largest AWG size for: (Size shown of 60% load, increase as required for larger loading)
    - a. 120 volt circuits exceeding 150 feet in circuit length.
    - b. 208 volt circuits exceeding 250 feet in circuit length.
  2. Wire sizes shall be increased for the above conditions whether indicated on the Drawings.

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- J. Use identified (white) neutrals and colored-coded phase wires for all branch circuit wiring.
  - 1. Make splices electrically and mechanically secure with pressure-type ILSCO Snapblock connectors, or LSI lugs to make splices electrically and mechanically secure. Soldering is not permitted for grounding equipment.
    - a. For wires size 6 AWG and smaller, provide "Scotch-lock" connectors.
  - 2. For wires size 4 AWG and larger, provide Burndy "Versitaps" and heavy-duty connectors, or T&B "lock-tite" connectors.

### 3.4 INSTALLATION OF GROUNDING SYSTEMS

- A. Coordinate existing conditions and wiring configurations to assure proper grounding systems are installed per NEC Art. 250. Where existing system grounding means are not known or clearly identifiable, contact Owner to provide as-built documents prior to start of Work.
- B. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- C. Underground Grounding Conductors: Install bare copper conductor, No. 2/0 AWG minimum.
  - 1. Bury at least 24 inches below grade.
- D. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
  - 1. Install bus horizontally, on insulated spacers 2 inches minimum from wall, 6 inches above finished floor unless otherwise indicated.
  - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
- E. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.
- F. Grounding at The Service: Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.
- G. Comply with IEEE C2 grounding requirements.
- H. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so 4 inches will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from 2

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inches above to 6 inches below concrete. Seal floor opening with waterproof, nonshrink grout.

- I. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields according to written instructions by manufacturer of splicing and termination kits.
- J. Equipment Grounding: Install insulated equipment grounding conductors with all feeders and branch circuits.
- K. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- L. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- M. Ground Rods: Drive rods until tops are 2 inches below finished floor or final grade unless otherwise indicated.
  - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
- N. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
  - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- O. Grounding and Bonding for Piping:
  - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
  - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
  - 3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

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- P. Perform tests and inspections as listed in “Testing and Inspections”.
- Q. Report measured ground resistances that exceed the following values:
  - 1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
  - 2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
  - 3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
  - 4. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 ohm(s).
  - 5. Substations and Pad-Mounted Equipment: 5 ohms.
  - 6. Manhole Grounds: 10 ohms.
- R. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

### 3.5 HANGERS AND SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70 utilizing listed beam clamps and supports. Tie-wires shall not be an acceptable method of securing raceways.
- C. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.
- D. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
- E. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.
- F. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb .
- G. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
  - 1. To Wood: Fasten with lag screws or through bolts.
  - 2. To New Concrete: Bolt to concrete inserts.

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3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
  4. To Existing Concrete: Expansion anchor fasteners.
  5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
  6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
  7. To Light Steel: Sheet metal screws.
  8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- H. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.
- I. Concrete Bases:
1. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
  2. Use 3000-psi , 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements as specified by equipment manufacturer.
  3. Anchor equipment to concrete base:
    - a. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    - b. Install anchor bolts to elevations required for proper attachment to supported equipment.
    - c. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

### 3.6 RACEWAYS AND BOXES INSTALLATION

- A. Selection of Raceways: Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of raceways. Consult Architect for resolution of conflicting requirements.
- B. Outdoors:
1. Exposed and Subject to Physical Damage: RMC.
  2. Exposed and Not Subject to Physical Damage: IMC.
  3. Concealed Aboveground: EMT.
  4. Direct Buried: PVC-40.
  5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
- C. Indoors:



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1. Hazardous Classified Locations: RMC.
  2. Exposed and Subject to Physical Damage: IMC.
  3. Exposed and Not Subject to Physical Damage: EMT.
  4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
  5. Damp or Wet Locations: IMC.
  6. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC.
- D. Raceway Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.
1. RMC and IMC: Provide threaded type fittings unless otherwise indicated.
- E. Installation of Raceways:
1. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for installation of raceways. Consult Architect for resolution of conflicting requirements.
  2. Comply with requirements in Section 260400 "Hangers and Supports for Electrical Systems" for hangers and supports.
  3. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.
  4. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4" and insulated throat metal bushings on 1-1/2" and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
  5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
  6. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
  7. Support conduit within 12" of enclosures to which attached.
  8. MC Cable or FMC is allowed in limited uses: Lighting whips, interior partition walls, and millwork. MC Cable is NOT allowed for homerun branch circuits.
  9. Adjust raceway sizes required for derating and ambient temperatures.
  10. Provide necessary sleeves and chases where conduits pass through floors and walls, and provide other necessary openings and spaces, arranging to prevent unnecessary cutting.
  11. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of raceways at the following points:
    - a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
    - b. Where an underground service raceway enters a building or structure.
    - c. Conduit extending from interior to exterior of building.
  12. Do not install conduits within 2" of the bottom side of a metal deck roof.
  13. Keep raceways at least 6" away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
  14. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength.
  15. Do not install aluminum raceways or fittings in contact with concrete or earth.

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- F. Underground conduit installations where open trenching occurs and accessible to public, shall require barriers and warning tape per OSHA guidelines.
- G. Where conduit or wiring is exposed, run parallel to, or at right angles with, lines of the building.
  - 1. Make bends with standard conduit elbows or conduit bent to not less than the same radius.
  - 2. Make bends free from dents and flattening.
  - 3. Where outlets and devices are installed exposed on masonry walls, contractor shall route conduit up to highest point on wall to junction box serving the device vertically.
- H. Where conduits pierce the roof, provide 24-gauge galvanized iron roof jacks and flashing collar brazed onto the conduits and covering the top of the roof jacks. Any brazing shall occur prior to installation of conductors.
- I. When boring, cutting or drilling structural wood or wall members, drill only in locations as approved by the Architect.
- J. Installation of Boxes and Enclosures:
  - 1. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.
  - 2. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.
  - 3. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall. Prepare block surfaces to provide a flat surface for a raintight connection between box and cover plate or supported equipment and box, whether installed indoors or outdoors.
  - 4. Locate boxes so that cover or plate will not span different building finishes.
  - 5. Support boxes in recessed ceilings independent of ceiling tiles and ceiling grid.
  - 6. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for purpose.
  - 7. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.
  - 8. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.
- K. INSTALLATION OF UNDERGROUND RACEWAYS
- L. Direct-Buried Conduit:
  - 1. Excavate trench bottom to provide firm and uniform support for conduit 36-inch below grade and 24-inch below finished slab-on-grade. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches in nominal diameter.
  - 2. Install backfill as specified in Section 312000 "Earth Moving."
  - 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final

conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."

4. Install manufactured rigid steel conduit elbows for stub-ups at poles, equipment pads and at building entrances through floor.
  - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
  - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
  - c. For PVC stub-ups at equipment mounted on concrete bases with formed raceway opening to enter cabinets, enclosures and boxes. Install PVC End Bell on service conduits for conductors No. 4 AWG and larger prior to pulling conductors.
5. Warning Planks: Bury warning planks approximately 12 inches above direct-buried conduits, but a minimum of 6 inches below grade. Align planks along centerline of conduit.
6. Underground Warning Tape: Provide at all utility and onsite generation for service entrances and comply with requirements listed by the Owner and local utility company.

M. INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

1. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
2. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
3. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.
4. Install handholes with bottom below frost line, 16-inches below grade.
5. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in enclosure.
6. Field cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.7 SLEEVE-SEAL SYTEM INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Comply with NECA 1.
- B. Comply with NEMA VE 2 for cable tray and cable penetrations.

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- C. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:
  - 1. Interior Penetrations of Non-Fire-Rated Walls and Floors:
    - a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Section 079200 "Joint Sealants."
    - b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.
  - 2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
  - 3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed or unless seismic criteria require different clearance.
  - 4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.
  - 5. Install sleeves for floor penetrations. Extend sleeves installed in floors 2 inches above finished floor level. Install sleeves during erection of floors.
- D. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:
  - 1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
  - 2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.
- E. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work and as specified by roofing manufacturer.
- F. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Underground, Exterior-Wall and Floor Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing sleeve-seal system.
- H. Sleeve-Seal-System Installation
  - 1. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at raceway entries into building.
  - 2. Install type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- I. Sleeve-Seal-Fitting Installation
  - 1. Install sleeve-seal fittings in new walls and slabs as they are constructed.

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2. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
3. Secure nailing flanges to concrete forms.
4. Using grout, seal the space around outside of sleeve-seal fittings.

### 3.8 INSTALLATION OF WIRING DEVICES

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
  1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
  2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
  1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
  2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
  3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
  4. Existing Conductors:
    - a. Cut back and pigtail, or replace all damaged conductors.
    - b. Straighten conductors that remain and remove corrosion and foreign matter.

### 3.9 INSTALLATION OF FUSES

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- B. Install labels complying with requirements for identification specified in "Identification for Electrical Systems" and indicating fuse replacement information inside of door of each fused switch and adjacent to each fuse block, socket, and holder.

### 3.10 INSTALLATION OF ENCLOSED SWITCHES AND CIRCUIT BREAKERS

- A. ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS
  1. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
    - a. Indoor, Dry and Clean Locations: NEMA 250, Type 1.

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- b. Outdoor Locations: NEMA 250, Type 3R.
    - c. Kitchen or Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
    - d. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
    - e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
    - f. Hazardous Areas Indicated on Drawings: NEMA 250, Type 7 with cover attached by Type 316 stainless steel bolts.
  - B. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:
    - 1. Notify Owner no fewer than ten days in advance of proposed interruption of electric service.
    - 2. Indicate method of providing temporary electric service.
    - 3. Do not proceed with interruption of electric service without Owner or Construction Manager's written permission.
    - 4. Comply with NFPA 70E.
  - C. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
  - D. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
  - E. Install fuses in fusible devices.
  - F. Comply with NFPA 70 and NECA 1.
  - G. IDENTIFICATION
    - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
    - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.
  - H. Test and Inspections: Section 260400 "Testing and Inspections."
    - 1. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
  - I. Prepare test and inspection reports.
    - 1. Test procedures used.
    - 2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
    - 3. List deficiencies detected, remedial action taken, and observations after remedial action.
- 3.11 INSTALLATION OF LIGHTING
- A. Comply with NECA 1.

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- B. Install luminaires level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports: Sized and rated for luminaire weight.
- E. Flush-Mounted Luminaire Support: Secured to outlet box.
- F. Wall-Mounted Luminaire Support:
  - 1. Attached to structural members in walls.
  - 2. Do not attach luminaires directly to gypsum board.
- G. Ceiling-Mounted Luminaire Support:
  - 1. Ceiling mount with two 5/32-inch- diameter aircraft cable supports adjustable to 120 inches in length.
  - 2. Ceiling mount with pendant mount with 5/32-inch- diameter aircraft cable supports adjustable to 120 inches in length.
  - 3. Ceiling mount with hook mount.
- H. Suspended Luminaire Support:
  - 1. Pendants and Rods: Where longer than 48 inches, brace to limit swinging.
  - 2. Stem-Mounted, Single-Unit Luminaires: Suspend with twin-stem hangers. Support with approved outlet box and accessories that hold stem and provide damping of luminaire oscillations. Support outlet box vertically to building structure using approved devices.
  - 3. Continuous Rows of Luminaires: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of luminaire chassis, including one at each end.
  - 4. Do not use ceiling grid as support for pendant luminaires. Connect support wires or rods to building structure.
- I. Ceiling-Grid-Mounted Luminaires:
  - 1. Secure to any required outlet box.
  - 2. Secure luminaire using approved fasteners in a minimum of four locations, spaced near corners of luminaire.
- J. Comply with requirements in Section 260400 "Low-Voltage Electrical Power Conductors and Cables" for wiring connections.
- K. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260400 "Identification for Electrical Systems."
- L. Perform the following tests and inspections:
  - 1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
  - 2. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery power and retransfer to normal.
  - 3. Photometric Requirements:

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- a. The performance shall be adjusted (depreciated) by using the LED manufacturer's data or the data from the IESNA Standard TM-21 test report, whichever one results in a higher level of lumen depreciation.
  - b. The initial minimum illuminance level is achieved in 100% of the area of the specified lighting pattern.
  - c. The measurements shall be calibrated to standard photopic calibrations.
  - d. Luminaire shall be tested per IESNA LM 79-08.
- M. Luminaire will be considered defective if it does not pass operation tests and inspections.
- N. Prepare test and inspection reports.

### 3.12 INSTALLATION OF POWER EQUIPMENT

- A. FLOOR-MOUNTED EQUIPMENT CONCRETE PAD: Install switchboards, transformers and enclosed controllers on concrete bases, 4-inch nominal thickness. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."
1. Install conduits entering under the vertical section where the conductors will terminate. Install with couplings flush with the concrete base. Extend 2 inches above concrete base after equipment is anchored in place.
  2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
  3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
  4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  5. Install anchor bolts to elevations required for proper attachment to supported equipment.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, straps and brackets, and temporary blocking of moving parts from enclosures and components.
- C. Provide power and control wiring for HVAC, switchboards, panelboards, motor starters and safety switches as shown on the Drawings.
- D. Connections to miscellaneous building equipment:
1. Wire to, and connect to, all items of building equipment not specifically described but to which line-voltage electrical power is required.
  2. Coordinate as necessary with other trades and suppliers to verify types, numbers and locations of equipment.
  3. Make final connections to all kitchen equipment per manufacturer's instructions.
  4. Mark each pull-box/junction box with a permanent ink marker the panel designation and circuit number contained.
- E. Mounting Heights:
1. Install light switch at 48 inches to center of device above finished floor. Unless otherwise noted.



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2. Install convenience receptacle at 18 inches to center of device above finished floor. Unless otherwise noted.
3. Install convenience receptacle at 4 inches to center of device, above back splash of counter top. Unless otherwise noted.
4. Install telephone jack rough in at 18 inches to center of device above finished floor. Unless otherwise noted.
5. Install telephone jack for side-reach wall telephone, to position top of telephone at 54 inches to center of device, above finished floor. Unless otherwise noted.

### 3.13 MATERIAL AND EQUIPMENT

- A. All materials and equipment shall be new, of the same type and manufacture, and shall be of the best quality and design and free from defects.
- B. A Manufacturer's nameplate affixed in a conspicuous place will be required on each major component of equipment stating Manufacturer's name, address and catalog number.

### 3.14 MISCELLANEOUS ITEMS

- A. The Contractor shall provide all miscellaneous items that would normally be required for proper installation of all electrical systems specified herein.
- B. Completed wiring systems shall be free from short circuits. After completion, this Division 26 shall perform tests for insulation resistance in accordance with the requirements of the National Electrical Code.
- C. Complete temperature control wiring rough-in is the responsibility of this Division 26. Coordinate with Division 23 to provide all locations for rough-in box and conduit requirements. Temperature control wiring shall be installed in conduit as specified by Division 23. Final terminations shall be by Division 23 unless system is 110 volts or greater.
- D. Provide all disconnects and safety switches for mechanical and plumbing equipment. Where safety switches serve equipment with multiple motors, switches shall be fused according to the nameplate of the equipment, or the breaker serving the equipment shall be "HACR" type.

### 3.15 CUTTING AND PATCHING

- A. The Electrical Contractor shall be responsible for cutting all floors, walls, partitions, ceilings or other construction required for proper installation of his Work. No cutting shall be done without prior approval of the Architect and all cutting shall be performed as directed by the Architect. Compacting of soil shall be provided in accordance to Division 2 Work. Concrete and Asphalt Work shall be provided in accordance to Division 2 Work.

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- B. The Electrical Contractor shall provide and install fire-safing material in penetrations through fire rated walls, floors, and ceilings in accordance with local codes.

### 3.16 CLEANING AND PLACING IN SERVICE

- A. Immediately prior to final inspection, the Contractor shall make a final cleanup of dirt and refuse resulting from his Work and shall assist in keeping the premises clean at all times.
- B. Immediately prior to final inspection, the Contractor shall clean all material and equipment installed under this Contract. Dirt, dust, plaster, stains and foreign matter shall be removed from all surfaces. Damaged finishes shall be touched up and restored to their original Condition.
- C. Mechanism of all equipment shall be checked, adjusted and tested for proper operation. Protective devices and parts shall be checked and tested for specified and required application and adjusted as required to produce the intended performance.

### 3.17 ADJUSTMENT AND INSTRUCTION

- A. Energize all systems, equipment, and fixtures and check for proper operation. Check electrical feeders for proper phasing and balance loads between phases.
- B. Position adjustable light fixtures to meet approval of Architect.

### 3.18 TESTING AND INSPECTION:

- A. Provide personnel and equipment, make required tests, and secure approvals from the Owner and governmental agencies having jurisdiction.
- B. Make written notice to the Owner adequately in advance of each of the following stages of construction:
  - 1. Underground electrical system installation is complete, but not covered.
  - 2. Rough-in installation of electrical systems are complete, but not covered.
  - 3. At final completion of the Work of this Section 260400.
- C. When material and/or workmanship is found to not comply with the specified requirements, within three days after receipt of notice of such non-compliance, remove the non-complying items from the job site and replace them with items complying with the specified requirements, all at no additional cost to the Owner.
- D. Provide personnel and equipment to perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Acceptance Testing:
    - a. Test insulation resistance for each distribution bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within

- the enclosure and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
    - b. Test continuity of each circuit. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Values shall not deviate more than 50 percent of lowest value tested.
    - c. Test ground-fault protection for service equipment per NFPA 70.
    - d. Use suitable test instrument to measure resistance to ground system. Test in accordance with test instrument manufacturer's specified fall-of potential method.
  - 2. Tests and Inspections:
    - a. Perform each visual, accessible bolted electrical connection, mechanical inspection and electrical test for component type stated in NETA Acceptance Testing Specification including Tables. Certify compliance with test parameters.
    - b. Correct malfunctioning units on-site where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
    - c. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
    - d. Prior to energizing motors, verify voltages are within plus or minus 10 percent of nameplate rated voltages at motor.
    - e. Test each connected motor for proper phase rotation.
  - E. In the Owner's Presence:
    - 1. Test all parts of the electrical system and prove that all such items provided under this Section function electrically in the required manner.
    - 2. Measure voltages between phases and between phase wires and neutrals, and report these voltages to the Owner.
    - 3. Immediately submit to the Owner a report of maximum and minimum voltages, and a copy of the recording volt-meter chart.
  - F. Adjust and set all time clocks in accordance with Owner's instructions.
  - G. When material and/or workmanship is found to not comply with the specified requirements, within three days after receipt of notice of such non-compliance, remove the non-complying items from the job site and replace them with items complying with the specified requirements, all at no additional cost to the Owner.
- 3.19 PROJECT COMPLETION:
- A. Upon completion of the Work of this Section, thoroughly clean all exposed portions of the electrical installation, removing all traces of soil, labels, grease, oil, and other foreign material, and using only the type cleaner recommended by the Manufacturer of the item being cleaned.
  - B. Thoroughly indoctrinate the Owner's operation and maintenance personnel in the contents of the operations and maintenance manual required to be submitted under Article 1.05 of this Section of these Specifications.

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END OF SECTION 260400

## **SECTION 311000 SITE CLEARING**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

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

#### **1.02 SUMMARY**

- A. This Section includes the following:
  - 1. Protecting existing trees, vegetation to remain.
  - 2. Removing existing trees, vegetation.
  - 3. Clearing and grubbing.
  - 4. Stripping and stockpiling topsoil.
  - 5. Removing above- and below-grade site improvements.
  - 6. Disconnecting, capping or sealing, and removing site utilities.
  - 7. Temporary erosion and sedimentation control measures.
- B. Related Sections include the following:
  - 1. Division 1 Section "Temporary Facilities and Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities.
  - 2. Division 1 Section "Temporary Tree and Plant Protection" for protecting trees remaining on-site that are affected by site operations.
  - 3. Division 1 Section "Execution" for verifying utility locations and for recording field measurements.
  - 4. Division 31 Section "Earth Moving" for soil materials, excavating, backfilling, and site grading.

#### **1.03 DEFINITIONS**

- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
- B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

#### **1.04 MATERIAL OWNERSHIP**

- A. Except for stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

#### **1.05 SUBMITTALS**

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

- B. Record drawings, according to Division 01 Section "Project Record Documents," identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

#### 1.06 QUALITY ASSURANCE

- A. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

#### 1.07 PROJECT CONDITIONS

- D. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
  - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- E. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.
- F. Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

### PART 2 - PRODUCTS

#### 2.01 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 31 Section "Earth Moving."
  - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

### PART 3 - EXECUTION

#### 3.01 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Locate and clearly flag trees and vegetation to remain or to be relocated.
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

#### 3.02 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways. Refer to Stormwater Pollution Prevention Plan.
- B. Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

- C. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### 3.03 TREE PROTECTION

- A. Do not excavate within tree protection zones, unless otherwise indicated.
- B. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.

### 3.04 UTILITIES

- A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
  - 1. Arrange with utility companies to shut off indicated utilities.
  - 2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- B. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.

### 3.05 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction.
  - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
  - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
  - 3. Remove rootballs. Remove roots, obstructions, and debris extending to a depth of 18 inches below exposed subgrade.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

### 3.06 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
  - 1. Remove subsoil and nonsoil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Limit height of topsoil stockpiles to 72 inches.
  - 2. Do not stockpile topsoil within tree protection zones.
  - 3. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.07 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
  - 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.
  - 2. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.08 DISPOSAL

- A. Disposal: Remove unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

**END OF SECTION 31 1000**



## **SECTION 312000 EARTH MOVING**

### **PART 1 - GENERAL**

#### **1.01 RELATED DOCUMENTS**

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

#### **1.02 SUMMARY**

- A. This Section includes the following:
  - 1. Preparing subgrades for areas outside the building perimeter.
  - 2. Excavating and backfilling for buildings and structures.
  - 3. Subbase and base course for paving.
  - 4. Subsurface drainage backfill for walls and trenches.
  - 5. Excavating and backfilling for utility trenches.
- B. Related Sections include the following:
  - 1. Division 01 Section "Unit Prices" for unit-price rock excavation and authorized additional excavation provisions.
  - 2. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities.
  - 3. Division 03 Section "Cast-in-Place Concrete" for granular course if placed over vapor retarder and beneath the slab-on-grade.
  - 4. Division 31 Section "Site Clearing" for temporary erosion and sedimentation control measures, site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.

#### **1.03 UNIT PRICES**

- A. Unit prices for earthwork are included in Division 01 Section "Unit Prices." Unit price shall include cost for removal of soft materials and replacement of imported structural fill per cubic yard plus a unit price for rock removal per cubic yard.

#### **1.04 DEFINITIONS**

- A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
  - 1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
  - 2. Final Backfill: Backfill placed over initial backfill to fill a trench.
- B. Base Course: Course placed between the subgrade and hot-mix asphalt or concrete paving.
- C. Bedding Course: Course placed over the excavated subgrade in a trench before laying pipe.
- D. Borrow Soil: Soil imported from off-site for use as fill or backfill.
- E. Drainage Course: Course supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
- F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for unit prices.
  2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- G. Fill: Soil materials used to raise existing grades.
- H. Initial Backfill: Fill free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit and as defined by utility trench detail on the plans.
- I. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, or ripping, or blasting, when permitted:
1. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch-wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,090 lbf and stick-crowd force of not less than 18,650 lbf; measured according to SAE J-1179.
  2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 210-hp flywheel power and developing a minimum of 48,510-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.
- J. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- K. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below base course, drainage fill, or topsoil materials.
- L. Utilities: Underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
- 1.05 SUBMITTALS
- A. Product Data: For the following:
1. Each type of plastic warning tape.
  2. Geotextile.
  3. Controlled low-strength material, including design mixture.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:
1. Classification according to ASTM D 2487 of each soil material proposed for fill and backfill.
  2. Laboratory compaction curve according to ASTM D 698 for each soil material proposed for fill and backfill.
- C. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

## 1.06 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 548.
- B. Preexcavation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

## PART 2 - PRODUCTS

### 2.01 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient on site materials do not match the Geotech report for engineered fill.
- B. Base Course: Naturally graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; conforming to ODOT Type "A" aggregate base.
- C. Engineered Fill:
  - 1. Structural fill within the proposed building and pavement areas shall have the following properties and as specified in the geotechnical report:
    - a. Material having a Plasticity Index (PI) of less than 20
    - b. Material having a Liquid Limit (LL) of less than 40
    - c. Maximum dry density in excess of 100 pounds per cubic foot
    - d. Maximum particle size of 3 inches
    - e. At least 30 percent of the material passing the No. 200 sieve
    - f. Shall be free of any organics
    - g. Prior to any filling operations, samples shall be tested by and approved by the owner's on-site geotechnical engineer.
  - 2. Portions of the onsite lower plasticity clay soils are suitable for use as structural fill within the proposed building and pavement areas; however, the contractor shall delineate the area with lower plasticity lean clay soils and collect a bulk sample prior to start of placement for moisture-density relationship and soil classification testing to evaluate the suitability for use as fill within proposed building and pavement areas.
  - 3. Refer to geotechnical report for other uses of onsite materials as fill.
- D. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve. Or as defined by the utility trench details.
- E. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.
- F. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.

### 2.02 GEOTEXTILES

- A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
4. Tear Strength: 56 lbf; ASTM D 4533.
5. Puncture Strength: 56 lbf; ASTM D 4833.
6. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

- B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

7. Survivability: Class 2; AASHTO M 288.
8. Grab Tensile Strength: 247 lbf; ASTM D 4632.
9. Sewn Seam Strength: 222 lbf; ASTM D 4632.
10. Tear Strength: 90 lbf; ASTM D 4533.
11. Puncture Strength: 90 lbf; ASTM D 4833.
12. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
13. Permittivity: 0.02 per second, minimum; ASTM D 4491.
14. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

## 2.03 CONTROLLED LOW-STRENGTH MATERIAL

- A. Controlled Low-Strength Material: Low-density, self-compacting, flowable concrete material as follows:
1. Portland Cement: ASTM C 150, Type I, II or III.
  2. Fly Ash: ASTM C 618, Class C or F.
  3. Normal-Weight Aggregate: ASTM C 33, 3/8-inch nominal maximum aggregate size.
  4. Foaming Agent: ASTM C 869.
  5. Water: ASTM C 94/C 94M.
  6. Air-Entraining Admixture: ASTM C 260.
- B. Produce conventional-weight, controlled low-strength material with 80-psi compressive strength when tested according to ASTM C 495.

## 2.03 ACCESSORIES

- A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
1. Red: Electric.
  2. Yellow: Gas, oil, steam, and dangerous materials.
  3. Orange: Telephone and other communications.
  4. Blue: Water systems.
  5. Green: Sewer systems.

## PART 3 - EXECUTION

### 3.01 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section "Site Clearing."
- C. Protect and maintain erosion and sedimentation controls, which are specified in Division 31 Section "Site Clearing," during earthwork operations.
- D. Provide protective insulating materials to protect subgrades and foundation soils against freezing temperatures or frost.

### 3.02 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
  - 1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches by providing adjacent dewatering trenches as required.
  - 2. Install a dewatering system to keep subgrades dry and convey ground water away from excavations. Maintain until dewatering is no longer required.
  - 3. It is anticipated that the groundwater will be perched within existing fill and/or underlying lower plasticity residual lean clay soils. Temporary perimeter drainage ditches, sumps, and pumps will be needed for removal of the perched water from open excavations and for the removal of additional surface rain water.

### 3.03 EXPLOSIVES

- A. Explosives: No explosives are allowed.

### 3.04 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsuitable soil materials and rock, replace with approved engineered fill materials.
  - 2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
    - a. 24 inches outside of concrete forms other than at footings.
    - b. 12 inches outside of concrete forms at footings.
    - c. 6 inches outside of minimum required dimensions of concrete cast against grade.
    - d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
    - e. 6 inches beneath bottom of concrete slabs on grade.
    - f. 6 inches beneath pipe in trenches.
  - 3. Care should be exercised during excavation/undercut of the soils adjacent to the existing building to avoid possible influence on the existing structure. The bearing materials of the foundation supporting the adjacent building should be protected during excavation.

### 3.06 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  - 1. Excavations for Footings and Foundations: undercut to a level of at least 12 inches below the design bearing elevation. Where fat clays (CH) soils are encountered, remove these soils within 24 inches of the bottom of the footing. After completion of undercutting the footing elevations can be brought back up to design elevation using approved and properly compacted lower plasticity engineered fill, low strength lean concrete or quick set flowable fill.
  - 2. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.
  - 3. Fat clay soils under the proposed building and other structures shall be undercut to a level of at least 18 inches below finished subgrade level and replaced with approved lower plasticity structural fill. All proposed building areas shall have a minimum of 18 inches undercut to allow for placement of properly compacted and approved lower plasticity structural fill.
  - 4. Overexcavation of soft clay soils shall extend 8 inches beyond the edges of the footing for each foot of undercut depth.
  - 5. Overexcavation of soft clay soils shall extend at least 5 feet beyond the perimeter of the proposed building footprint, where feasible.

### 3.07 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.08 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
  - 1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

### 3.09 SUBGRADE INSPECTION

- A. Notify Engineer when excavations have reached required subgrade.
- B. If Architect or Engineer determines unsatisfactory soil is present based on the geotechnical engineer's recommendations, continue excavation and replace with compacted backfill or fill material as directed. Loose and disturbed materials, shall be removed from the subgrade before placing the geogrid. The subgrade shall be free of standing water when the geogrid is placed. Soil subgrades that become unstable due to inadequate construction dewatering or

excessive subgrade disturbance shall be corrected by the contractor at no additional cost to the owner.

- C. Soft clay soils within the building and pavement areas shall be removed full-depth and replaced with properly compacted and approved lower plasticity engineered fill.
- D. Undercut any exposed clayey chert gravel (GC) exposed within the proposed building areas to a depth of at least 18 inches and replace with approved, lower plasticity engineered fill.
- E. Building Areas - After stripping and completing any cuts, removal of soft clay soils. the exposed clay soils shall be scarified to a minimum depth of 8 inches, moisture conditioned to within a range of 2 percent below to 2 percent above the optimum moisture content and recompacted to at least 98% of the materials maximum dry density (ASTM D 698)
- F. Pavement Areas - After stripping and completing any cuts, the exposed clay soils shall be scarified to a minimum depth of 8 inches, moisture conditioned to within a range of 2 percent below to 2 percent above the optimum moisture content and recompacted to at least 95% of the material's maximum dry density (ASTM D 698)
- G. Following moisture conditioning and recompaction the exposed subgrade shall be proofrolled. Proof-roll subgrade under the observation of the geotechnical engineer, with a loaded, tandem-axle dump truck weighing at least 25 tons, to locate any zones that are soft or unstable. The proofrolling should involve overlapping passes in mutually perpendicular directions. Where rutting or pumping is observed during proof-rolling, the unstable soils shall be over-excavated and replaced with low volume change soils. The project geotechnical engineer or a qualified representative shall observe the proofrolling operations. All unstable and/or soft materials identified during the subgrade evaluation need to be removed prior to the placement of fill or construction of building and pavements.
- H. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

### 3.10 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Engineer.
  - 1. Fill unauthorized excavations under other construction or utility pipe as directed by Engineer.

### 3.11 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated on-site suitable soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.12 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade including, where applicable, sub-drainage, damp-proofing, waterproofing, and perimeter insulation.
  - 2. Surveying locations of underground utilities for Record Documents.

3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.
7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

- B. Place backfill on subgrades free of mud, frost, snow, or ice.

### 3.13 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Place and compact initial backfill of , free of particles larger than 1 inch in any dimension, to a height of 12 inches over the utility pipe or conduit.
  1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- D. Controlled Low-Strength Material: Place initial backfill of controlled low-strength material to a height of 12 inches over the utility pipe or conduit.
- E. Backfill voids while installing and removing shoring and bracing.
- F. Place and compact final backfill to final subgrade elevation.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.
- H. Construct clay "trench plug" that extends at least 5 feet out from the face of the building exterior. The plug material shall consist of clay compacted at a water content at or above the soils optimum water content. The clay fill shall be placed to completely surround the utility line and be compacted to at least 95% standard proctor density.

### 3.14 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  1. Under grass and planted areas, use engineered fill or on-site material.
  2. Under walks and pavements, use engineered fill or on-site material
  3. Under steps and ramps, use engineered fill.
  4. Under building slabs, use engineered fill.
  5. Under footings and foundations, use engineered fill.
- C. Place soil fill on subgrades free of mud, frost, snow, or ice.
- D. Existing slopes steeper than 5 horizontal to 1 vertical (5:1) and located in fill areas shall be benched prior to fill placement. Benches shall be cut as the fill placement progresses and shall have a maximum bench height of 2 to 3 feet.



### 3.15 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within range of 2 percent above to 2 percent below the material's optimum moisture content, determined in accordance with ASTM D-698, (standard Proctor procedure).
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.
  - 3. Both density and moisture requirements shall be met.

### 3.16 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers between 8 and 12 inches in depth for material compacted by heavy compaction equipment, and not more than 4 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 :
  - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 8 inches of existing subgrade and each layer of backfill or fill soil material at 98 percent and 95 percent for pavement areas.
  - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
  - 3. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
  - 4. For utility trenches in unpaved areas, compact each layer of initial and final backfill soil material at 85 percent. In paved areas, compact utility trench backfill at 95 percent.

### 3.17 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
  - 1. Provide a smooth transition between adjacent existing grades and new grades.
  - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
  - 1. Lawn or Unpaved Areas: Plus or minus 1 inch.
  - 2. Walks and Pavements: minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

### 3.18 BASE COURSES

- A. Place base course on subgrade free of mud, frost, snow, or ice.
- B. On prepared subgrade, place base course under pavements and walks as follows:

1. Where indicated, install separation geotextile on prepared subgrade according to manufacturer's written instructions, overlapping sides and ends.
2. Shape base course to required crown elevations and cross-slope grades.
3. Place base course in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
4. Compact base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D-698.

### 3.19 DRAINAGE COURSE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
  1. Place drainage course in compacted thickness shown on plans 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 relative density according to ASTM D 698.

### 3.20 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. 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.
- C. Contact Engineer for subgrade proofrolling.
- D. 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.
- E. Perform Atterberg limits tests on fly ash and cement kiln dust treated fill/backfill materials placed in the building area for the low volume change fill layer at frequency of at least 1 test per 5,000 SF of area with at least 2 test per lift. Intent of Atterberg limits testing is to determine if the soil has been effectively treated.
- F. 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. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2000 sq. ft. or less of paved area or building slab, but in no case fewer than 3 tests.
  2. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.
  3. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.
- G. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

- H. Density and moisture test shall be performed on each lift prior to placement of subsequent lifts.

### 3.21 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion prior to placement of subsequent base course, paving, or foundations above. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
  - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### 3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove waste material, including unsuitable soil, trash, and debris, and legally dispose of it off Owner's property.
- B. Transport surplus engineered fill to designated storage areas on Owner's property.

**END OF SECTION 31 2000**

**SECTION 31 2500  
EROSION AND SEDIMENTATION CONTROL**

**PART 1 – GENERAL**

**1.01 SUMMARY**

- A. Section Includes
  - 1. Installation of temporary and permanent erosion and sedimentation control systems.
  - 2. Installation of temporary and permanent slope protection systems.
- B. Related Sections
  - 1. Section 31 10 00 – Site Clearing
  - 2. Section 31 20 00 – Earth Moving

**1.02 ENVIRONMENTAL REQUIREMENTS**

- A. Protect adjacent properties; any identified endangered or threatened species or critical habitat, any identified cultural or historic resources, and receiving water resources from erosion and sediment damage until final stabilization.

**1.03 REFERENCES**

- A. Oklahoma Department of Transportation, Standard Specifications for Highway Construction, 2009 (including amendments, supplements and special provisions).

**PART 2 – PRODUCTS**

**2.01 MATERIALS**

- A. Sediment control devices as specified on the Construction Drawings. Specified items on the Construction Drawings shall comply with Section 221 of the ODOT Standard Specifications.
- B. Rip-Rap as specified on the plans and in Section 31 37 00.
- C. Temporary and permanent outfall structures as specified on the drawings.

**PART 3 – EXECUTION**

**3.01 PREPARATION**

- A. Review the drawings and Storm Water Pollution Prevention Plan.
- B. Revise SWPPP as necessary to address potential pollution from site.
- C. Conduct storm water preconstruction meeting with Site Contractor, all ground-disturbing subcontractors, site engineer of record or someone from their office familiar with the site and SWPPP.

**3.02 EROSION AND SEDIMENTATION CONTROL AND SLOPE PROTECTION  
IMPLEMENTATION**

- A. Place erosion and sediment control systems in accordance with the drawings and Storm Water Pollution Prevention Plan or as may be dictated by site conditions in order to maintain the intent of the specifications and permits.
- B. Deficiencies or changes on the drawings or Storm Water Pollution Prevention Plan shall be corrected or implemented as site conditions change. Changes during construction shall be noted in the Storm Water Pollution Prevention Plan and posted on the drawings (Erosion Control Plans).
- C. Owner has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow and embankment operations and to direct Contractor to provide immediate permanent or temporary pollution control measures.
- D. Maintain temporary erosion and sedimentation control systems as dictated by site conditions, indicated in the construction documents, or as directed by governing authorities or Owner to control sediment until final stabilization. Contractor shall respond to maintenance or additional work ordered by Owner or governing authorities immediately, but in no case, within not more than 48 hours if required at no additional cost to the Owner.
- E. Contractor shall incorporate permanent erosion control features, paving, permanent slope stabilization, and vegetation into project at earliest practical time to minimize need for temporary controls.
- F. Unless required within a shorter timeframe by the applicable General Permit for Storm Water Discharges Associated with Construction Activity, disturbed areas that will not be graded or actively worked for a period of 14 days or more, shall be temporarily stabilized as work progresses with vegetation or other acceptable means. In the event it is not practical to seed areas, slopes must be stabilized with mulch and tackifier, bonded fiber matrix, netting, blankets or other means to reduce the erosive potential of the area.

**END OF SECTION 31 2500**

## **SECTION 313116 TERMITE CONTROL**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Chemical soil treatment.
- B. Site-applied termiticide for wood, steel, and concrete.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Vapor barrier placement under concrete slab-on-grade.

#### **1.03 REFERENCE STANDARDS**

- A. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act 2019.

#### **1.04 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. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements.
- D. Test Reports: Indicate regulatory agency approval reports when required.
- E. Certificate of compliance from authority having jurisdiction indicating approval of toxicants.
- F. Manufacturer's Instructions: Indicate caution requirement.
- G. Record and document moisture content of soil before application, date and rate of application, areas of application, and diary of toxicity meter readings and corresponding soil coverage.
- H. Installer Qualifications: Company specializing in performing work of the type specified and with minimum ten years of documented experience.
- I. Warranty: Submit warranty and ensure that forms have been completed in Owner's name.

#### **1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing this type of work and:
  - 1. Having minimum of ten years documented experience.
  - 2. Approved by manufacturer of treatment materials.
  - 3. Licensed in the State in which the Project is located.

#### **1.06 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.

### **PART 2 PRODUCTS**

#### **2.01 CHEMICAL SOIL TREATMENT**

- A. Toxicant Chemical: EPA Title 7, United States Code, 136 through 136y approved; synthetically color dyed to permit visual identification of treated soil.
- B. Diluent: Recommended by toxicant manufacturer.
- C. Mixes: Mix toxicant to manufacturer's instructions.
- D. Toxicant Chemical: EPA approved; synthetically color dyed to permit visual identification of treated soil.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.
- B. Verify final grading is complete.

### **3.02 APPLICATION - CHEMICAL TREATMENT**

- A. Comply with requirements of U.S. EPA and applicable state and local codes.
- B. Spray apply toxicant in accordance with manufacturer's instructions.
- C. Apply toxicant at following locations:
  - 1. Under Slabs-on-Grade.
  - 2. At Both Sides of Foundation Surface.
  - 3. Soil Within 10 feet (3 m) of Building Perimeter For a Depth of 5 feet (1.5 m).
- D. Under slabs, apply toxicant immediately prior to installation of vapor barrier.
- E. At foundation walls, apply toxicant immediately prior to finish grading work outside foundations
- F. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.
- G. Re-treat disturbed treated soil with same toxicant as original treatment.
- H. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

### **3.03 INSTALLATION - SITE-APPLIED TERMITICIDE**

- A. Comply with manufacturer's written instructions.

### **3.04 PROTECTION**

- A. Do not permit soil grading over treated work.
- B. Protect sheet materials from damage after completed installation. Repair damage with manufacturer's recommended products and according to the manufacturer's written instructions.

**END OF SECTION 313116**

**SECTION 321313  
CONCRETE PAVING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. This Section includes exterior cement concrete pavement for the following:
  - 1. Curbs and gutters.
  - 2. Walkways.
  - 3. Ramps and steps.
  - 4. Drives and roadways
- B. Related Sections include the following:
  - 1. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.
  - 2. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.
  - 3. Division 32 Section "Concrete Paving Joint Sealants" for joint sealants of joints in concrete pavement and at isolation joints of concrete pavement with adjacent construction.

**1.03 DEFINITIONS**

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

**1.04 SUBMITTALS**

- A. Product Data: For each type of manufactured material and product indicated.
- B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Qualification Data: For manufacturer.
- D. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:
  - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
- E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
  - 1. Cementitious materials.
  - 2. Steel reinforcement and reinforcement accessories.
  - 3. Fiber reinforcement.
  - 4. Admixtures.



5. Curing compounds.
6. Applied finish materials.
7. Bonding agent or epoxy adhesive.
8. Joint fillers.

F. Minutes of preinstallation conference.

#### 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
  1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
- C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.
- D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

#### 1.06 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

### PART 2 - PRODUCTS

#### 2.01 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
  1. Use flexible or curved forms for curves with a radius 100 feet or less.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

#### 2.02 STEEL REINFORCEMENT

- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- C. Epoxy-Coated Welded Wire Fabric: ASTM A 884/A 884M, Class A, plain steel.
- D. Reinforcing Bars: ASTM A 615/A 615M, Grade 60; deformed.
- E. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized after fabrication and bending; with ASTM A 615/A 615M, Grade 60 deformed bars.

- F. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, Grade 60 deformed bars.
- G. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60, deformed bars; assembled with clips.
- H. Plain Steel Wire: ASTM A 82.
- I. Deformed-Steel Wire: ASTM A 496.
- J. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A coated, deformed.
- K. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60. Cut bars true to length with ends square and free of burrs.
- L. Epoxy-Coated Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60, plain steel bars.
- M. Tie Bars: ASTM A 615/A 615M, Grade 60, deformed.
- N. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:
  - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
  - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
- O. Epoxy Repair Coating: Liquid two-part epoxy repair coating, compatible with epoxy coating on reinforcement.
- P. Zinc Repair Material: ASTM A 780.

## 2.03 CONCRETE MATERIALS

- A. Cementitious Material: Use one of cementitious materials, of the same type, brand, and source throughout the Project:
  - 1. Portland Cement
- B. Normal-Weight Aggregates: ASTM C 33, Class coarse aggregate, uniformly graded. Conform to ODOT specifications for highway construction. Provide aggregates from a single source.
- C. Water: ASTM C 94/C 94M.
- D. Air-Entraining Admixture: ASTM C 260.
- E. Chemical Admixtures: Provide admixtures as allowed by ODOT specifications for highway construction.
- F. Calcium chloride shall not be permitted in concrete mixtures.

## 2.04 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
  - 1. Products: Conform to ODOT.
- E. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
  - 1. Products: Conform to ODOT.
- F. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.
  - 1. Products: Conform to ODOT.

## 2.05 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
  - 1. Color: As indicated by manufacturer's designation Match Architect's sample As selected by Architect from manufacturer's full range.
- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery with emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to requirements, and as follows:
  - 1. Types I and II, non-load bearing IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Chemical Surface Retarder: Water-soluble, liquid-set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.
  - 1. Products: Conform to ODOT.

## 2.06 PAVEMENT MARKINGS

- A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952E, Type II, with drying time of less than 45 minutes.
  - 1. Color: As indicated.

## 2.07 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete to conform to ODOT specifications for highway construction for properties.
  - 1. Compressive Strength (28 Days): 4,000 psi Maximum Water-Cementitious Materials
  - 2. Ratio at Point of Placement: 0.45.
  - 3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
  - 1. Air Content: 5 to 7 percent
- D. Chemical Admixtures: Conform to ODOT specifications for highway construction.
  - 1. Use water-reducing admixture high-range, water-reducing admixture high-range, water-reducing and retarding admixture plasticizing and retarding admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
- E. Cementitious Materials: Conform to the ODOT specifications for highway construction Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.
  - 1. Fly Ash or Pozzolan: 25 percent.
  - 2. Ground Granulated Blast-Furnace Slag: 50 percent.
  - 3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.

## 2.09 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116. Furnish batch certificates for each batch discharged and used in the Work.
  - 1. When air temperature is between 85 deg F and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
  - 1. For concrete mixes of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
  - 2. For concrete mixes larger than 1 cu. yd, increase mixing time by 15 seconds for each additional 1 cu. yd.
  - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding.
  - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
  - 2. Proof-roll with a loaded 10-wheel tandem-axle dump truck weighing not less than 50 tons.
  - 3. Subbase with soft spots and areas of pumping or rutting exceeding depth of 1/4 inch require correction according to requirements in Division 31 Section "Earth Moving."
- C. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

### 3.02 PREPARATION

- A. Remove loose material from compacted subbase surface immediately before placing concrete.
- B. Precautions to protect fresh concrete from developing plastic shrinkage cracks must be taken in advance of concrete placement when evaporation rate due to any combination of temperature, humidity, and wind velocity is expected to approach 0.2 lb./sq. ft./hr. as determined by Figure 2.1.5 of ACI 305. Acceptable precautions to reduce the rate of evaporation include use of wind breaks, monomolecular film evaporation retarders, fog spray, covering with polyethylene sheeting, or wet cover.

### 3.03 EDGE FORMS AND SCREED CONSTRUCTION

- A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
- B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

### 3.04 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
- C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
- D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

- E. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.
- F. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

### 3.05 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.
  - 1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.
  - 1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
  - 2. Provide tie bars at sides of pavement strips where indicated.
  - 3. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
  - 4. Locate expansion joints at intervals of 50 feet, unless otherwise indicated.
  - 5. Extend joint fillers full width and depth of joint.
  - 6. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
  - 7. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
  - 8. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
  - 9. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:
  - 10. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 3/8-inch radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
  - 11. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade (within 12 hours of concrete pour), or otherwise damage surface and before developing random contraction cracks.
  - 12. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated and at construction joints. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

- E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 3/8-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

### 3.06 CONCRETE PLACEMENT

- A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.
- B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to fresh concrete after testing.
- F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
- G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
  - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
- H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Place top layer of concrete, strike off, and screed.
  - 1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.
- I. Screed pavement surfaces with a straightedge and strike off.
- J. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
- K. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.
- L. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.
  - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

- M. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.
- N. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
  - 1. When air temperature has fallen to or is expected to fall below 40 deg F , uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
  - 2. Do not use frozen materials or materials containing ice or snow.
  - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.
- O. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
  - 1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
  - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

### 3.07 FLOAT FINISHING

- A. General: Do not add water to concrete surfaces during finishing operations.
- B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
  - 1. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
  - 2. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
  - 3. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

### 3.08 CONCRETE PROTECTION AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Comply with ACI 306.1 for cold-weather protection.
- C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.



- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
  - 1. Moist Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

### 3.09 PAVEMENT TOLERANCES

- A. Comply with tolerances of ACI 117 and as follows:
  - 1. Elevation: 1/4 inch .
  - 2. Thickness: Plus 3/8 inch, minus 1/4 inch.
  - 3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
  - 4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
  - 5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
  - 6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch.
  - 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
  - 8. Joint Spacing: 3 inches.
  - 9. Contraction Joint Depth: Plus 1/4 inch, no minus.
  - 10. Joint Width: Plus 1/8 inch, no minus.

### 3.10 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Allow concrete pavement to cure for 21 days and be dry 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. Spread glass beads uniformly into wet pavement markings at a rate of 6 lb/gal.

### 3.11 FIELD QUALITY CONTROL

- A. Retain first option in paragraph below if Owner engages agency; retain second option if Contractor engages agency. If retaining second option, retain requirement for field quality-control test reports in Part 1 "Submittals" Article.
- B. Testing Agency: a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- C. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  - 1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
  - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
  - 4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
  - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
  - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
    - a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.
- D. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- E. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- H. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.
- I. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

### 3.12 REPAIRS AND PROTECTION

- A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.
- C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

**END OF SECTION 32 1313**

**SECTION 321316**  
**ARCHITECTURAL CONCRETE PAVING**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. ARCHITECTURAL CAST-IN-PLACE CONCRETE PAVING.

**1.02 REFERENCES**

- A. ACI 301 - Specifications for Structural Concrete for Buildings.
- B. ACI 303 - Guide to Cast-in-Place Architectural Concrete Practice.
- C. ACI 305R - Hot Weather Concreting.
- D. ACI 306R - Cold Weather Concreting.
- E. ACI 308 - Standard Practice for Curing Concrete.
- F. ACI 347 - Guide to Formwork for Concrete.
- G. ASTM C33 - Standard Specifications for Concrete Aggregates.
- H. ASTM C150 - Standard Specifications for Portland Cement.
- I. ASTM C260 - Standard Specifications for Air-Entraining Admixtures for Concrete.
- J. ASTM C494 - Standard Specifications for Chemical Admixtures for Concrete.
- K. ASTM A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- L. ASTM C94 - Standard Specification for Ready-Mixed Concrete.
- M. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

**1.03 SUBMITTALS**

- A. Submit under provisions of Section 01 3000.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Shop Drawings:
  - 1. Paving jointing and pour sequence plan.
    - a. Proposed layout of expansion and control joints. Clearly delineate the different joint types. Refer to Drawings for joint layout patterns.
    - b. Layout of paving types/ colors as indicated in drawings and selected through sampling.
- D. Statement of Mix Design: submit one copy of statement prepared by batch plant servicing Project for each load delivered to Project. Statement shall include the following information:
  - 1. Name, address, and telephone number of batch plant preparing statement of mix design.
  - 2. Date of mix design.
  - 3. Project location.
  - 4. Contractor requesting load delivery.
  - 5. Mix design number.
  - 6. Integral color used.
  - 7. Gradations for sand and aggregate.
  - 8. Material weights, specific gravity, and absolute volumes.
  - 9. Basis of testing.
  - 10. Water/ cement ratio.
  - 11. PSI rating.
- E. Joints: Submit manufacturer's joint material and sealant. Provide manufacturer's standard colors for selection by Architect.

- F. Stamped Concrete: Submit product data, samples, and installation literature for material specified.
- G. Colored Concrete: Submit manufacturer's complete sample chip set, including pigment number and required dosage rate for each color.
- H. Concrete Sealer: Submit product data and application literature for material specified.
- I. Testing:
  - 1. Perform testing and analysis under provisions of Section 014000.
  - 2. Submit proposed mix design for each class of concrete for review prior to commencement of work.
  - 3. Testing firm will take cylinders and perform slump and air entrainment tests in accordance with ACI 301.
  - 4. Four concrete test cylinders will be taken for each class of concrete placed each day.
  - 5. One slump test will be taken for each set of test cylinders taken.

#### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
- B. Installer Qualifications:
  - 1. The Installer shall provide a qualified foreman or supervisor who has a minimum of three years experience with imprinted and textured concrete, and who has successfully completed at least 25 Architectural Paving Systems concrete installations of high quality and similar in scope to that required.
  - 2. The concrete is cast in place, on the job site, by trained and experienced workmen who shall be employed by an approved manufacturer.
  - 3. Perform work in accordance with ACI 301, 302, 303.
  - 4. Obtain materials from same source throughout.
- C. Ready-Mixed Supplier Qualifications: Supplier of ready-mixed concrete products shall comply with ASTM C 94 requirements for production facilities and equipment. Supplier shall be certified according to NCRMA's "Certification of Ready Mixed Concrete Production Facilities Quality Control Manuals."
- D. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- E. Mock-Up:
  - 1. Provide field sample prior to beginning work, 48 inches by 48 inches in size illustrating paving finish for each type of finish specified.
  - 2. Do not proceed with remaining work until workmanship, pattern, color, and sheen are approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.
  - 4. Include control and expansion joints in mock up for review and approval.
  - 5. Retain samples of cements, sands, aggregates used in mockup for comparison with materials used in remaining work.
  - 6. Accepted mock-up slab is considered basis of quality for the finished work. Keep mock-up exposed to view for duration of concrete work.
  - 7. Approved mock-up may remain as part of the Work. Un-approved mock-up shall be removed.

#### **1.05 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.

#### **1.06 PROJECT CONDITIONS**

- A. Do not place pavement when base surface or ambient temperature is less than 40 degrees F (4 degrees C) or if base surface is wet or frozen.
- B. 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.

## **1.07 WARRANTY**

- A. All materials manufactured warranted to be of uniform quality within manufacturing tolerances.

## **PART 2 - PRODUCTS**

### **2.01 ARCHITECTURAL CONCRETE SYSTEM**

- A. Manufacturers:
  - 1. The Bomanite Company, [www.bomanite.com](http://www.bomanite.com) <<http://www.bomanite.com>>
  - 2. Approved equal.
  - 3. Requests for substitutions will be considered in accordance with provisions of Section 01 6000.
- B. Architectural Concrete Systems, reference Drawings for location:
  - 1. Bomanite Sandscape Texture with Alloy
- C. Supporting Structure:
  - 1. Mix Design:
    - a. Mix and deliver concrete in accordance with ASTM C94, Alternate 2.
    - b. Use accelerating admixtures containing no calcium chloride in cold weather only when approved by testing laboratory. Use of admixtures will not relax cold weather placement requirements.
    - c. Use set retarding admixtures during hot weather only when approved by testing laboratory.
    - d. Add air entraining agent to concrete mix for concrete work exposed to exterior, in amounts of 4 to 7 percent of total concrete volume or as otherwise recommended by testing laboratory.
    - e. Add coloring admixture where scheduled in quantities recommended by coloring admixture manufacturer to achieve selected color.
    - f. Maintain water cement ratio to produce a minimum of 3 to maximum of 5 inch slump.
    - g. Use of calcium chloride is strictly prohibited.
  - 2. Subgrade:
    - a. Refer to drawings and specifications for scope of subgrade preparation.
  - 3. Reinforcement:
    - a. Fiber Reinforcement: ASTM C948, collated, fibrillated, 3/4 inch (19 mm) long virgin polypropylene fibers.
    - b. Reinforcing Steel: ASTM A615; Grade 60; deformed billet steel bars, uncoated finish.
- D. Primary Concrete Color:
  - 1. Color Hardener Concrete Color: To be determined through sampling.
- E. Secondary Concrete Color:
  - 1. Con Color: To be determined through sampling
  - 2. Con Color: match existing to remain.
- F. Pattern/ Texture:
  - 1. To be determined through sampling.
- G. Sealer:
  - 1. Commercial exterior grade, sheen to be determined through sampling.

### **2.02 RELATED MATERIALS**

- A. Cement: ASTM C150, type 1, Portland cement, gray color.
- B. Fine and Coarse Aggregates: ASTM C33.

- C. Water: Clean and not detrimental to concrete.
- D. Form Material: Conform to ACI 301. If using metal, material shall be free from deformities. If using wood, use construction grade lumber, sound and free of warp, minimum 2 inches (51 mm) nominal thickness, except where short radii of curves require thinner forms.
- E. Tie Wire: Annealed steel, minimum 16 gauge (1.519 mm) size.
- F. Dowels: ASTM A615; Grade 40, plain steel, uncoated finish.
- G. Miscellaneous Reinforcing Accessories: Spacers, chairs, ties, and other devices necessary for properly placing, spacing, supporting, and fastening reinforcement in place.
- H. Air-Entraining Admixture: ASTM C 206. Air Entrained Concrete shall be used wherever concrete is exposed to the freezing weather. Proportions of entrained air, as determined by ASTM C233, and C260, shall be as follows:
- I. Joint Fillers:
  - 1. Joint Filler: Polyethylene foam expansion joint material, 3/8 inch thick.
- J. Sealants: Two part polyurethane sealants, grade as required to suit application.
  - 1. Color: To be determined through sampling

### **PART 3 - EXECUTION**

#### **3.01 INSTALLATION**

- A. Installation of architectural concrete paving must be performed by certified installers only.

#### **3.02 INSPECTION**

- A. Verify compacted subgrade is ready to support paving and imposed loads, free of frost, smooth and properly compacted.
- B. Verify gradients and elevations of base are correct, and proper drainage has been provided so water does not stand in the area to receive paving.
- C. Beginning of installation means acceptance of existing conditions.

#### **3.03 PREPARATION**

- A. If vapor retarding membrane is not used, moisten base to minimize absorption of water from fresh concrete.
- B. Notify Architect and testing laboratory, minimum 24 hours prior to commencement of concreting operations.

#### **3.04 FORMING**

- A. Construct and remove forms in accordance with ACI 347.
- B. Place and secure forms to correct location, dimension, and profile. Adequately brace to withstand loads applied during concrete placement.
- C. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- D. Place joint fillers vertical in position, in straight lines. Secure to formwork during concrete placement.

#### **3.05 INSERTS AND ACCESSORIES**

- A. Make provisions for installation of inserts, accessories, anchors, and sleeves.

#### **3.06 REINFORCEMENT**

- A. Accurately place reinforcement in middle of slabs-on-grade.
- B. Discontinue every other bar of reinforcement at control and expansion joints.
- C. Support reinforcing on bar chairs. Securely saddle tie at intersections. Rigidly secure in place to minimize displacement during concrete pour.

#### **3.07 JOINTS**

- A. Intentional stoppage of concrete placing shall be at planned location of either an expansion joint or contraction joint.
- B. Provide sawed contraction joints in vehicular paving and curbs spaced as detailed on Drawings, but in no case greater than 20 feet (6 m) o.c. spacing.
  - 1. Saw joints after completion of finishing operations as soon as concrete has hardened to extent necessary to prevent revealing of joint or damage to adjacent concrete surfaces.
  - 2. Saw joints same day that concrete is placed except that sawing of joints in concrete placed late in day may be delayed until morning of following day.
  - 3. In any event, saw joints within 18 hours after placing concrete.
  - 4. Use a power-driven concrete saw made especially for sawing concrete and maintain in good operating condition.
  - 5. Saw cut shall be to a depth equal to 1/4 of slab thickness.
  - 6. Align joints in vehicular paving with joints in adjacent pedestrian paving.
  - 7. Cut joints through curbs at right angles to back of curb.
- C. Place joint filler between paving components and building or other appurtenances.
- D. Provide scored joints in sidewalks and plazas to a depth of 1/4 the slab thickness, and at intervals as indicated, but in no case spaced greater than width of walk.

### **3.08 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 301, 302, and 304. Deposit concrete so that specified slab thickness will be obtained after vibrating and finishing operations. Minimize handling to prevent segregation. Consolidate concrete by suitable means to prevent formation of voids or honeycombs. Exercise care to prevent disturbance of forms and reinforcing and damage to vapor retarder. Place concrete to lines and levels shown, properly sloped to drain as designed.
  - 1. Hot Weather Placement: ACI 305.
  - 2. Cold Weather Placement: ACI 306.
  - 3. Ensure reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
  - 4. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- B. After consolidating and screeding, float concrete to gradients indicated. Use a straight edge to level and test surface in longitudinal direction to required grade. Finish edges to provide a smooth dense surface with 1/8 inch (3 mm) radius.
- C. Apply Color Hardener prior to finishing. Apply at rate recommended by manufacturer, evenly to the surface of the fresh concrete by the dry-shake method. Applied in two or more shakes, floated after each shake and troweled only after the final floating.
- D. Apply stencil and scored/ saw-cut pattern per approved mock-up.
- E. Apply finish sealer per approved mock-up or as specified to achieve design required.

### **3.09 SEALING**

- A. Seal surface of paving using manufacturer-recommended sealer for best results.
- B. Final cleaning, calking, and sealing operations shall not commence until Architectural Concrete Paving surfaces have been completely and properly cured or 28 days, whichever is later.
- C. Follow Sealer directions when applying product (sealer must be applied in 3 to 6 coats).

### **3.10 FIELD QUALITY CONTROL**

- A. Field inspection and testing will be performed under provisions of Section 014000.
- B. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

### **3.11 PROTECTION**

- A. Immediately after placement, protect concrete under provisions of Section 01500 from premature drying, excessive hot or cold temperatures, and mechanical injury.



**END OF SECTION 321316 321316**

**SECTION 321373**  
**CONCRETE PAVING JOINT SEALANTS**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. This Section includes the following:
  - 1. Expansion and contraction joints within cement concrete pavement.
  - 2. Joints between cement concrete and asphalt pavement.
- B. Related Sections include the following:
  - 1. Division 07 Section "Joint Sealants" for sealing nontraffic and traffic joints in locations not specified in this Section.
  - 2. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

**1.03 SUBMITTALS**

- A. Product Data: For each joint-sealant product indicated.
- B. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- C. Qualification Data: For Installer.
- D. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for sealants.

**1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
  - 1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  - 2. Submit not fewer than four pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
  - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.

4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
  5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing of current sealant products within a 36-month period preceding the commencement of the Work.
1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 for testing indicated, as documented according to ASTM E 548.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

#### 1.06 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
  2. When joint substrates are wet or covered with frost.
  3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

### PART 2 - PRODUCTS

#### 2.01 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

#### 2.03 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

#### 2.04 COLD-APPLIED JOINT SEALANTS

- A. Type SL Silicone Sealant for Concrete and Asphalt: Single-component, low-modulus, neutral-curing, self-leveling silicone sealant complying with ASTM D 5893 for Type SL.
  1. Products:
    - a. Crafcro Inc.; Road Saver Silicone SL.

- b. Dow Corning Corporation; 890-SL.

## 2.05 JOINT-SEALANT BACKER MATERIALS

- A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
- B. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.
- D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

## 2.06 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

# PART 3 - EXECUTION

## 3.01 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.02 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

## 3.03 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

- C. Install backer materials of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of backer materials.
  - 2. Do not stretch, twist, puncture, or tear backer materials.
  - 3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses provided for each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealants from surfaces adjacent to joint.
  - 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.
- G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

#### 3.04 CLEANING

- A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

#### 3.05 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

**END OF SECTION 32 1373**

## **SECTION 321416 BRICK UNIT PAVING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Brick Pavers.
- B. Sand Materials.
- C. Accessories.

#### **1.02 REFERENCE STANDARDS**

- A. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- B. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- C. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- D. ASTM C902 - Standard Specification for Pedestrian and Light Traffic Paving Brick 2022.

#### **1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittals procedures.
- B. Shop Drawings: Indicate on shop drawings, layout of pavers, layout of curbs and borders, dimensions of paved areas, control jointing, elevations, and affected adjacent construction.

#### **1.04 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing the work of this section with 3 years experience.

#### **1.05 MOCK-UP**

- A. See Section 014000 - Quality Requirements, for general requirements for mock-up.
- B. Size: 100 sq ft (10 sq m).
- C. Install setting bed, brick pavers, curbs and border, and accessories to pattern indicated.
  - 1. Show range of shades, color, and texture of pavers.
- D. Mock-up may remain as part of the Work.

#### **1.06 FIELD CONDITIONS**

- A. At end of working day, or during rainy weather, cover work exposed to weather with waterproof coverings, securely anchored.

### **PART 2 PRODUCTS**

#### **2.01 APPLICATIONS**

- A. Sidewalks and Residential Driveways: Pavers for pedestrian traffic.
  - 1. Setting Bed: sand with sand swept joints.
  - 2. Subbase: See drawings.

#### **2.02 BRICK PAVERS**

- A. Pavers for Pedestrian Traffic: existing pavers to be salvaged and re-installed; any new pavers required to finish the work shall match existing; field verify.

#### **2.03 SAND MATERIALS**

- A. Sand for Base and Joint Filler: ASTM C33/C33M, clean, washed river or bank sand containing maximum of 50 percent particle size of No. 50 (300 micro m) sieve.
- B. Polymeric Sand: Fine sand complying with ASTM C144 combined with polymer binders for creating semi-solid joints between pavers.

#### **2.04 ACCESSORIES**

- A. Cleaning Solution: Type recommended by paver manufacturer.

### **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify substrate is ready to support pavers and imposed loads.
- B. Verify gradients and elevations of substrate are correct.
- C. Verify dry weather forecast without rain for a minimum of 24 hours with temperatures above 55 degrees Fahrenheit (13 degrees Celsius).
- D. Verify that pavers are completely dry prior to polymeric sand installation.

### **3.02 INSTALLATION - SAND SETTING BED**

- A. Spread sand evenly over prepared substrate surface to a nominal thickness of 1-1/2 inches (38 mm).
- B. Dampen and roller compact sand to level surface.
- C. Screed and scarify top 1/2 inch (13 mm) of sand.
- D. Place half units or special shaped units at edges and interruptions. Maintain tight joints. Machine saw partial units.
- E. Spread polymeric sand uniformly over surface. Use a push broom to fill joints and remove excess while not sweeping long distances. Sweep all excess with a fine bristle brush and remove residues with a leaf blower.
- F. Tamp and level paver units with mechanical plate vibrator until units are firmly bedded, level, and to correct elevation and slope gradient.
- G. Using a sprayer set to shower, apply water on specific areas between 100 square feet (10 m) and 500 square feet (50 m) to a depth of 1 1/2 inches (4 cm). Complete one section at a time and avoid flooding the pavers.

### **3.03 CLEANING**

- A. Clean soiled surfaces using cleaning solution. Do not harm pavers, joint materials, or adjacent surfaces.
- B. Use non-metallic tools in cleaning operations.
- C. Rinse surfaces with clean water.
- D. Broom clean paving surfaces. Dispose of excess sand.

### **3.04 PROTECTION**

- A. Do not permit traffic over unprotected paver surface.
- B. Do not permit traffic for 48 hours after pavement placement.

**END OF SECTION 321416**

**SECTION 328423  
UNDERGROUND SPRINKLERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Delegated Design: Design 100 percent coverage irrigation system, incorporating connection to existing irrigation system to remain, including comprehensive analysis by a qualified professional irrigation designer, using performance requirements and design criteria indicated.
- B. Perform work required to complete an automatic irrigation system for Project site.
- C. Irrigation zone control shall be automatic operation with controller and automatic control valves.

**1.02 SUMMARY**

- A. Work Includes:
  - 1. Cap and removal of irrigation components to be abandoned.
  - 2. Verification of, and connection to, existing irrigation mainline.
  - 3. Piping and all required utility hook-ups.
  - 4. Sprinkler heads and dripline.
  - 5. Connection to existing sprinkler controller, including electrical, field verify location.
  - 6. Automatic control valves with boxes.
  - 7. Backflow preventer—connect to existing.
  - 8. Provide complete irrigation system including trenching and backfilling for all pipes, drain valves and pits, providing mains, laterals, risers, fittings, sprinkler heads, driplines, control valves, electric wiring, and necessary specialties and accessories.
  - 9. Provide sleeves beneath parking areas, walkways, roads, and driveways where required.
  - 10. Other irrigation components, as described in this specification.

**1.03 REFERENCE STANDARDS**

- A. ASTM B32 - Standard Specification for Solder Metal 2020.
- B. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes 2020.
- C. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2020.
- D. ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings 2022.
- E. ASTM D2241 - Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series) 2020.
- F. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems 2020.
- G. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination: Coordinate the work with site backfilling, landscape grading and delivery of plant life.
- B. Verifications: Verify location and available water pressure of existing irrigation mainline.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate piping layout to water source, location of sleeves under pavement, location and coverage of sprinkler heads, components, plant and landscaping features, site structures, schedule of fittings to be used. Include zoning chart showing each irrigation zone and its control valve.
- C. Record Documents: Record actual locations of all concealed components piping system.
- D. Operation and Maintenance Data:



1. Provide instructions for operation and maintenance of system and controls, seasonal activation and shutdown, and manufacturer's parts catalog.
  2. Provide schedule indicating length of time each valve is required to be open to provide a determined amount of water.
- E. Maintenance Materials: Provide the following for Owner's use in maintenance of project.
1. See Section 016000 - Product Requirements, for additional provisions.
  2. Extra Sprinkler Heads: Two of each type and size.
  3. Extra Valve Keys for Manual Valves: Two.
  4. Extra Valve Box Keys: Two.
  5. Extra Valve Marker Keys: Two.
  6. Wrenches: Two for each type head core and for removing and installing each type head.

#### **1.06 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years of experience.

#### **1.07 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for piping and component requirements.
- B. It shall be the Contractor's responsibility to obtain all required inspections, permits and fees required by authorities having jurisdiction at no additional cost to the Owner.

#### **1.08 COORDINATION**

- A. It shall be the responsibility of the Contractor to coordinate irrigation components with existing conditions. Any sprinkler heads that do not provide the proper water coverage or provide the necessary overlap of sprays will be adjusted or additional heads added as required for complete coverage. Any conflicts or required adjustments will be promptly executed at no additional cost to the Owner.
- B. Coordinate irrigation work with the site work progress throughout construction. Coordinate with other trades as required, including installation of sleeves and connection to site water line.

#### **1.09 GUARANTEE AND REPLACEMENT**

- A. For a period of one year after the Owner's final acceptance, the Contractor shall replace and install, immediately and without additional cost to the Owner, all equipment or components which proves defective in material, workmanship or installation.

#### **1.10 MAINTENANCE SERVICES (SEE END OF SECTION)**

### **PART 2 PRODUCTS**

#### **2.01 IRRIGATION SYSTEM**

- A. Electric solenoid controlled underground irrigation system, with low point self drain.
- B. Manufacturers:
1. Match existing irrigation products to remain.
  2. Approved equal.
  3. Substitutions: See Section 016000 - Product Requirements.

#### **2.02 PIPE MATERIALS**

- A. Mainline piping above ground shall be copper tube, Type K, drawn temper; copper tube fittings; soldered joints.
- B. All piping from the supply to backflow preventer shall be Schedule 40 PVC 1120-1220, conforming to ASTM D-1785 and D-2672.
- C. Piping 2-1/2" in diameter and larger shall be: PVC 1120-1220 SDR 21.0, Class 200 rubber gasket joint pipe, conforming to ASTM D-1784 and ASTM D-2241. Rubber gasket shall conform to ASTM D-3139 and shall be provided by pipe manufacturer.
- D. Piping 3/4" inch through 2" diameter shall be: PVC 112D-122D, SDR 21.0, Class 200 belled end solvent weld, and conforming to ASTM D 2241-73.

- E. Fittings for PVC Pipe:
  - 1. Fittings for PVC pipe 3" and larger shall be Harco or equal, IPS Ductile Iron gasket joint type.
  - 2. Fittings for PVC pipe 2" and larger that is under continuous pressure shall be Harco or similar IPS Ductile Iron Gasket joint type.
  - 3. Other fittings for PVC pipe shall be Schedule 40 PVC as manufactured by Spears, Dura or equal.
  - 4. Threaded PVC nipples shall be Schedule 80 as manufactured by Spears, Dura, or equal.
- F. Sleeve Material: Schedule 80 PVC; twice the diameter of the pipe to run inside it.

## **2.03 OUTLETS**

- A. Rotors
  - 1. Manufacturers:
    - a. Match existing to remain.
    - b. Approved equal.
- B. Spray Heads
  - 1. Manufacturers:
    - a. Match existing to remain.
    - b. Approved equal.
- C. Drip
  - 1. Manufacturers:
    - a. Rainbird; Product - XFS series dripline.
    - b. Approved equal.
- D. Quick Coupler: Brass 1-Piece Body, stainless steel spring, locking rubber cover.

## **2.04 VALVES**

- A. Manufacturers:
  - 1. Match existing to remain.
  - 2. At Drip Irrigation: Rainbird; Product - Wide Flow Commercial Control Zone Kit with Scrubber Valve and Pressure Regulating Basket Filter.
  - 3. Approved equal.
- B. Ball Valves: Spears Schedule 80 series 2339 True Union Ball Valves, or approved equal.
- C. Backflow Preventer: existing to remain; field verify location.
- D. Valve Box and Cover: by Carson, or approved equal.
  - 1. Cover color: green.
  - 2. Covers shall be mechanically fastened.
  - 3. Covers shall be engraved with corresponding labels (i.e. 'Irrigation Control Valve').
- E. Drain Valves: Rainbird 16A-FDV, King Drains, or approved equal.

## **2.05 CONTROLS**

- A. Controller: tie new irrigation work into existing controller to remain.
- B. Wire Conductors: Color coded.
  - 1. System wiring shall be UF/UL direct burial copper wire. Insulation shall be a minimum of 4/64" thick ICC-100 compound. Sizes 14, 12, 10, and 8 shall be solid copper. Minimum size on all installations shall be 14 gauge. Wiring from controller to valves shall be one continuous run free of splices unless over 500 feet. Splices in runs over 500 feet shall be made using 3M Scotchlok #3570 splice kits and be contained in appropriate valve box. All wire connections and splices shall be contained in a valve box. Underground tracing wire shall be 14 gauge Brown UF/UL solid copper wire. Tracer wire shall be installed in all MAIN line and SUBMAIN line trenches where 24 volt valve control wiring is not installed. All tracer wire runs shall be continuous runs with no wire splices under 500 feet. Splices over 500 feet shall be made using 3M Scotchlok #3570 splice kits.

## **2.06 OTHER MATERIALS**

- A. Provide other materials, not specifically described, but required for a complete and proper installation, as selected by the Contractor and subject to approval by the Architect.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify location of existing utilities.
- B. Verify that required utilities are available, in proper location, and ready for use.
- C. Field test and verify water pressure at the site prior to beginning installation.

### **3.02 DEMOLITION**

- A. Remove and dispose of existing irrigation heads and associated components that are no longer required.
- B. Backfill, fine grade, and sod areas disturbed by demolition work.

### **3.03 PREPARATION**

- A. Piping layout indicated is diagrammatic only. Route piping to avoid plants, ground cover, and structures.
- B. Layout and stake locations of system components.
- C. Review layout requirements with other affected work. Coordinate locations of sleeves under paving to accommodate system.

### **3.04 TRENCHING**

- A. Trench to accommodate grade changes and slope to drains.
- B. Maintain trenches free of debris, material, or obstructions that may damage pipe.

### **3.05 INSTALLATION**

- A. Install pipe, valves, controls, and outlets in accordance with manufacturer's instructions.
  - 1. Piping:
    - a. Minimum coverage for all laterals is 12 inches.
    - b. Minimum coverage for all sleeves, main lines and control wires is 18 inches.
    - c. Install thrust blocks of 3,000 psi concrete where the irrigation main changes direction at ells and tees, where main line terminates, and under gate valves.
  - 2. Outlets:
    - a. Set lawn heads flush with grade. Allow for turfgrass height so that spray is not restricted.
    - b. Where sprinkler heads are adjacent to walks or curbs, allow 2-inch space between head and paving for edging operations.
    - c. 18-inch long poly pipe at spray heads.
    - d. 12-inch long schedule 80 quadruple rigid arm swing at rotor heads.
    - e. Set driplines 3" below finish elevation of planting soil.
  - 3. Controller:
    - a. Field verify location.
    - b. Affix zone number wire labels to all station wires inside the controller box.
  - 4. Valves:
    - a. Set at depth of pressure piping and equipment with valve access box.
    - b. Valve Box:
      - 1) Mount flush and level with grade using extensions as required. No portion of valve box shall rest on pipe of valve.
      - 2) Boxes shall have 4" depth of clean #57 aggregate to serve as box base.
      - 3) Backfill box with 4-6" of clean #57 aggregate to provide clean installation without soil.
      - 4) Irrigation valves, or other buried irrigation apparatus, shall be accessible.

- c. Automatic Drain Valves: Provide 1-cubic foot of clean #57 aggregate at each automatic drain valve. Install at low points of each zone. Install at 45-degree angle per manufacturer's instructions.
- B. Connect to utilities.
- C. Set outlets and box covers at finish grade elevations.
- D. Provide for thermal movement of components in system.
- E. Slope piping for self drainage to gravel filled well point.
- F. Use threaded nipples for risers to each outlet.
- G. Control Wiring:
  - 1. Install control wires with sprinkler mains and laterals in common trenches. Tape wiring to the side of pipe in same trench. Provide 5' looped slack at valves and snake wires in trench to allow for contraction of wires. Tie wires in bundles at 10' intervals.
  - 2. Control wire line splices will be allowed only on runs of more than 500'. Splices to be made in valve boxes with 15" of slack.
  - 3. Make electrical splices waterproof.
- H. After piping is installed, but before outlets are installed and backfilling commences, open valves and flush system with full head of water.

### **3.06 FIELD QUALITY CONTROL**

- A. Upon completion of the installation, the entire system shall be tested and adjusted for proper operation and distribution of the system. Obtain complete coverage with wind velocity not more than six miles per hour. Each zone shall be tested. Contractor shall make all requested adjustments and repairs, including addition of heads if necessary for coverage. Re-inspections will be held as necessary until all modifications have been satisfactorily made.
- B. Pressure Testing:
  - 1. Flush piping clear of dirt and foreign matter.
  - 2. Test on pressure lines shall be completed prior to final backfilling.
  - 3. Fittings and couplings must be open to visual inspection for the full period of the test.
  - 4. Do no test until the last solvent welded joint has set and cured for eight hours.
  - 5. Control valves shall be closed.
  - 6. Expel air from piping before testing.
  - 7. Test duration: Eight hours minimum. System shall be subject to full line pressure. Should any leaks occur, repair defect and re-test for full duration of test.

### **3.07 BACKFILLING**

- A. Backfill in lawn areas using approved topsoil.
- B. Backfill shall leave no depressions. Sod all trenches per Section 32 9223.
- C. Should depressions develop after completion of the work, the Contractor shall be responsible for additional topsoil or other work to correct depressions.
- D. Where trenches are under paved areas, backfill trenches in six inch lifts and mechanically compact each layer to 95 percent standard proctor density.

### **3.08 SYSTEM STARTUP**

- A. Prepare and start system in accordance with manufacturer's instructions.
- B. Adjust control system to achieve time cycles required.
- C. Adjust head types for full water coverage as directed.

### **3.09 CLOSEOUT ACTIVITIES**

- A. Instruct Owner's personnel in operation and maintenance of system, including adjusting of sprinkler heads. Use operation and maintenance data as basis for demonstration.

### **3.10 RECORD DRAWINGS**

- A. Reproducible record drawings shall be provided to the Owner prior to date of substantial completion. Drawings shall accurately show location of system components, including heads, main and lateral piping, valves, controller, backflow preventer, and meter.
- B. Provide 2 laminated copies of irrigation zones, to be placed in a sleeve inside controller box. Color-code to identify the extent of each zone.

### **3.11 CONTRACTOR'S RESPONSIBILITY**

- A. The Contract specifications do not set forth every item or detail required to complete this work. This shall not be construed as relieving the Contractor from furnishing all labor, materials, equipment, service, or transportation necessary to obtain an operable irrigation system, efficiently performing the function for which it was designed.

### **3.12 MAINTENANCE**

- A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide one complete spring start-up and a fall shutdown by installer, at no extra cost to Owner.

**END OF SECTION 328423**

## **SECTION 329223 SODDING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Fertilizing.
- D. Sod installation.
- E. Maintenance.

#### **1.02 DEFINITIONS**

- A. Weeds: Includes Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

#### **1.03 REFERENCE STANDARDS**

- A. TPI (SPEC) - Guideline Specifications to Turfgrass Sodding 2006.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Certificate: Certify grass species and location of sod source.

#### **1.05 QUALITY ASSURANCE**

- A. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience, and certified by the State of Project location.
- B. Installer Qualifications: Company approved by the sod producer.

#### **1.06 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

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

- A. Deliver sod in rolls. Protect exposed roots from dehydration.
- B. Protect exposed roots from dehydration.
- C. Do not deliver more sod than can be laid within 24 hours.

#### **1.08 MAINTENANCE**

- A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. Sod: TPI, Certified Turfgrass Sod quality; cultivated grass sod; type indicated below; with strong fibrous root system, free of stones, burned or bare spots; containing no more than 5 weeds per 1000 sq ft (100 sq m). Minimum age of 18 months, with root development that will support its own weight without tearing, when suspended vertically by holding the upper two corners.
  - 1. Bermuda Grass Type 'Astro'.
- B. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay, or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.

- C. Fertilizer: Recommended for specified grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated by analysis.
- D. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.

## **2.02 ACCESSORIES**

- A. Herbicide: Pre and Post Emergent Herbicide effective for controlling the germination or growth of weeds.

## **2.03 SOURCE QUALITY CONTROL**

- A. Provide analysis of topsoil fill under provisions of Section 014000.
- B. Submit topsoil testing analysis for review:
  1. Analyze to ascertain percentage of nitrogen, phosphorus, potash soluble salt content, organic matter content, and pH value.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that prepared soil base is ready to receive the work of this section.

### **3.02 PREPARATION**

- A. Scarify subsoil to a depth of 6-inches.
- B. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels profile and contours. Make change in grade gradual. Blend slopes into level areas.
- C. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated subsoil.

### **3.03 PLACING TOPSOIL**

- A. Spread approved topsoil to a minimum compacted depth of six inches over area to be sodded. Prepare until smooth.
  1. Existing topsoil excavated and stockpiled on-site may be utilized.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material while spreading.
- D. Grade to eliminate rough, low, or soft areas, and to ensure positive drainage away from structures.
- E. Finish ground level firm and sufficient to prevent sinkage pockets when irrigation is applied.

### **3.04 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions at a rate of 3 lb./100 square feet.
- B. Apply after smooth raking of topsoil and prior to installation of sod.
- C. Apply fertilizer no more than 48 hours before laying sod.
- D. Mix thoroughly into upper 2 inches (50 mm) of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

### **3.05 LAYING SOD**

- A. Moisten prepared surface immediately prior to laying sod.
- B. Remove and dispose of plastic net backing.
- C. Lay sod immediately after delivery to site to prevent deterioration. Sod pallet time shall not exceed 24 hours.
- D. Lay sod smooth and tight with no open joints visible, and no overlapping; stagger end joints 12 inches (300 mm) minimum. Do not stretch or overlap sod pieces.
- E. Where new sod adjoins existing grass areas, align top surfaces.

- F. Where sod is placed adjacent to hard surfaces, such as curbs, pavements, etc., place top elevation of sod 1 inch (25 mm) below top of hard surface.
- G. Water sodded areas immediately after installation. Saturate sod to 3 inches (76 mm) of soil which is approximately 1-inch of water per day for the first 2-3 weeks.
- H. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities.

### **3.06 MAINTENANCE**

- A. Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.
- B. Contractor shall water (irrigated and non-irrigated) sodded areas as required until grass is well established and exhibits a vigorous growing condition.
- C. Mowing:
  - 1. Astro Bermuda:
    - a. Mow grass at regular intervals to maintain at a maximum height of 2-inches. Do not cut more than 1/3 of grass blade at any one mowing.
    - b. Mow every 5-7 days during the active growing season.
- D. Neatly trim edges and hand clip where necessary.
- E. Roll surface to remove irregularities.
- F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions for the specified turfgrass type. Remedy damage resulting from improper use of herbicides.
- G. Immediately replace sod to areas that show deterioration or bare spots.
- H. Watering Post Establishment:
  - 1. Apply 1-inch of water in a single application about once per week during hot and dry conditions. To promote a deep, durable root system, deep soaking water applications are preferred over short and frequent shallow water applications.

**END OF SECTION 329223**



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## **SECTION 329300 PLANTS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Preparation of subsoil.
- B. Planting soil: Landscape Bed Planting Soil, Topsoil, CU Structural Soil.
- C. Soil amendment materials.
- D. New trees, plants, and ground cover.
- E. Mulch.
- F. Accessories.
- G. Maintenance.
- H. Tree pruning.

#### **1.02 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

#### **1.03 REFERENCE STANDARDS**

- A. ANSI/AHIA Z60.1 - American National Standard for Nursery Stock 2014.
- B. ANSI A300 Part 1 - American National Standard for Tree Care Operations - Tree, Shrub, and Other Woody Plant Management - Standard Practices (Pruning) 2017.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Submit list of plant life sources.
- C. Plant Materials: Include quantities, sizes, and quality of plant materials.
- D. Submit product data/ cutsheets for planting soil, mulch, fertilizer, and accessories.

#### **1.05 QUALITY ASSURANCE**

- A. Nursery Qualifications: Company specializing in growing and cultivating the plants with five years documented experience.
- B. Installer Qualifications: Company specializing in installing and planting the plants with five years documented experience.
- C. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
- D. Tree Pruner Qualifications: Company specializing in pruning trees with proof of Arborist Certification.
- E. Tree Pruning: Conform to ANSI A300 Part 1.
- F. Maintenance Services: Performed by installer.

#### **1.06 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

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

- A. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.
- B. Protect and maintain plant life until planted.
- C. Deliver plant life materials immediately prior to placement. Keep plants moist.

#### **1.08 FIELD CONDITIONS**

- A. Do not install plant life when ambient temperatures may drop below 35 degrees F (2 degrees C) or rise above 90 degrees F (32 degrees C).
- B. Do not install plant life when wind velocity exceeds 30 mph (48 k/hr).
- C. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- D. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of each service or utility.
  - 2. Do not proceed with interruption of services or utilities without Owner's written permission.
- E. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.
  - 1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

#### **1.09 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide one year warranty.
- C. Warranty: Include coverage for one continuous growing season; replace dead or unhealthy plants.
- D. Replacements: Plants of same size and species as specified, planted in the next growing season, with a new warranty commencing on date of replacement.

#### **1.10 MAINTENANCE**

- A. Reference Part 3 of this section.

### **PART 2 PRODUCTS**

#### **2.01 PLANTS**

- A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.
- B. Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.
- C. If formal arrangements or consecutive order of plants is shown on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

#### **2.02 SOIL MATERIALS**

- A. Landscape Bed Planting Soil: 50% Gem Dirt Garden Soil (or approved equal)/ 50% topsoil. Verify suitability of native surface topsoil to produce viable planting soil.
- B. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; minimum pH value of 5.4 and maximum 7.0.
- C. CU Structural Soil:

1. By licensed supplier of CU Structural Soil (also known as CU-Soil) developed at Cornell University.

## **2.03 SOIL AMENDMENT MATERIALS**

- A. Water: Clean, fresh, and free of substances or matter that could inhibit vigorous growth of plants.
- B. Herbicide: Pre and Post Emergent Herbicide effective for controlling the germination or growth of weeds within planted areas.
- C. Pesticide: Registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific pest and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

## **2.04 MULCH MATERIALS**

- A. Organic Mulching Material: Double shredded hardwood mulch (natural color), free of growth or germination inhibiting ingredients.

## **2.05 ACCESSORIES**

- A. Root Ball Stabilization Devices: Below grade stabilization systems to secure each new tree by root ball; sized per manufacturer's instructions.
  1. Approved Products:
    - a. Foresight Products, LLC; Duckbill Rootball Fixing System.
    - b. Approved equal.
- B. Pine Tree Stabilization: at pine trees, secure each new tree with t-post (three each equally spaced) and guy wire with nylon tree strap.
- C. Edging: As indicated per drawings.
- D. Tree Protector: by Arborgard, or approved equal; grey

## **2.06 SOURCE QUALITY CONTROL**

- A. Provide analysis of topsoil; comply with requirements of Section 014000.
- B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt, organic matter, and pH value.

# **PART 3 EXECUTION**

## **3.01 EXAMINATION**

- A. Verify that prepared subsoil and landscape beds are ready to receive work.
- B. Saturate soil with water to test drainage.
- C. Verify that required underground utilities are available, in proper location, and ready for use.
- D. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- E. Install erosion control measures to prevent erosion or displacement of soils and discharge of soil bearing water runoff or airborne dust to adjacent properties and walkways.

## **3.02 PREPARATION OF SUBSOIL**

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 3 inches (75 mm) where plants are to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

## **3.03 PLACING PLANTING SOIL**

- A. Place planting soil during dry weather and on dry unfrozen subgrade.

- B. Remove vegetable matter and foreign non-organic material from soil while spreading.
- C. Grade planting soil to eliminate rough, low or soft areas, and to ensure positive drainage.
- D. Install soil into pits and beds intended for plant root balls at depth per Drawings.

#### **3.04 PLACING CU STRUCTURAL SOIL**

- A. Installation shall be by certified installer, or installation reviewed by licensed supplier.
- B. Compact to 90% of max density per AASHTO T99. Compaction shall be done with mechanical compactors, including vibratory compactors, and/ or powered tampers, and rollers.

#### **3.05 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after initial raking of topsoil.
- C. Mix thoroughly into upper 2 inches (50 mm) of topsoil.
- D. Lightly water to aid the dissipation of fertilizer.

#### **3.06 PLANTING**

- A. Excavate two-three times as wide as root ball diameter.
  - 1. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
  - 2. Maintain supervision of excavations during working hours.
  - 3. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
  - 4. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
- B. Place plants as indicated for review and final orientation by Architect.
- C. Relocate plants as directed for approval.
- D. Set plants vertical.
- E. Remove non-biodegradable root containers.
- F. Set plants in pits or beds, partly filled with prepared plant mix, at a minimum depth as indicated on drawings under each plant. Remove burlap, ropes, and wires, from the root ball.
- G. Place bare root plant materials so roots lie in a natural position. Backfill soil mixture in 6 inch (150 mm) layers. Maintain plant life in vertical position.
- H. Saturate soil with water when the pit or bed is half full of planting soil and again when full.

#### **3.07 MULCHING**

- A. Apply three inch (four inch at trees) minimum thickness of mulch over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

#### **3.08 INSTALLATION OF ACCESSORIES**

- A. Edging: Provide and install edging per drawings and manufacturer's instructions.
- B. Wrap tree trunks with tree protectors.

#### **3.09 PLANT SUPPORT**

- A. Root Ball Stabilization: Install root ball stabilization system sized and positioned as recommended by manufacturer and according to manufacturer's written instructions.

#### **3.10 TREE PRUNING**

- A. Prune trees as recommended in ANSI A300 Part 1.
- B. Prune newly planted trees as required to remove dead, broken, and split branches.

#### **3.11 CLEAN UP AND PROTECTION**

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.
- D. Disposal: Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

### **3.12 MAINTENANCE**

- A. Maintain plant life for three months after Date of Substantial Completion.
- B. Cultivate and weed plant beds and tree pits.
- C. Remove dead or broken branches and treat pruned areas or other wounds.
- D. Immediately remove clippings after trimming.
- E. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions.
- F. Control insect damage and disease. Apply pesticides in accordance with manufacturers instructions.
- G. Remedy damage from use of herbicides and pesticides.
- H. Replace mulch when deteriorated.
- I. Repair or replace accessories when required.

**END OF SECTION 329300**