

## NORTH BRANCH AREA SCHOOL DISTRICT REQUEST FOR BIDS

North Branch, MI. 48461

Posted May 17, 2023

BIDS ARE DUE: June 21, 2023 BY 2:00 P.M.

At North Branch Area Central Office

6655 Jefferson St

North Branch, MI 48461

### I. BID

#### 1. Purpose Of Bid:

North Branch Area School District is in need of hiring a qualified general contractor to construct a new sports complex restroom facility 6598 Brush St, North Branch, MI 48461

#### Bid Terms:

A. North Branch Area School District reserves the right to reject any or all bids for no reason.

B. Bids must be signed by an official authorized to bind the contractor to its provisions for at least a period of 90 days. Failure of the successful proposer to accept the obligation of the bid may result in the cancellation of any award.

C. In the event it becomes necessary to revise any part of the RFB, addenda will be provided. Deadlines for submission of the RFB's may be adjusted to allow for revisions. Emailed bids will not be accepted.

D. Bids should be prepared simply and economically, providing a straight-forward concise description of the contractor's ability to meet the requirements of the RFB.

E. A formal written contract will be executed between North Branch Area School District and the awarded contractor.

### II. BID SPECIFICATIONS

The bid response shall include all of the following information. Failure to include all of the required information may result in disqualification of a bid.

1. Contractor's qualifications, years in business, and experience in providing the level and type of work specified in the bid.
2. Bank References with name and phone number of contact person.
3. At least three (3) current references from owners of similar projects listed in the bid. Include company name, contact name and phone number.

### III. GENERAL SPECIFICATIONS

#### 1.Site Details

A. Please see attached plan documents.

B. Job must be completed by September 17, 2023

C. The bidder shall, before submitting the bid, carefully examine the proposal, plans, specifications, and contract documents. The bidder shall inspect in detail the site of the proposed work and be familiar with all the local conditions affecting the contract. If successful, the bidder will be responsible for all errors in the proposal resulting from failure or neglect to comply with these instructions. North Branch Area Community Schools will, in no case, be responsible for any change in anticipated profits resulting from such failure or neglect.

#### 2. Project Specifications

A. The contractor shall provide all labor, materials, equipment, subcontractors and supervision for completion of the project. This includes general construction, electrical, HVAC and plumbing work associated with the project.

B. All clean up shall comply with all applicable Federal, State, and local laws and regulations.

C. Contractor shall, at all times, keep the site free from accumulation of waste materials, debris or rubbish caused by his or her employees at work. Contractor shall remove from the site all tools, surplus materials, debris or rubbish and shall leave the site and the work in a neat and orderly fashion at the completion of the work.

D. Arrangements may be made, in advance, by Contractor for leased waste containers for disposal of construction debris at Contractor's expense.

E. No smoking or drinking is allowed on any school premises.

#### 3. Bid Security/Performance Bond

A. Accompanying this proposal shall be a Bid Bond (or Certified/Cashier's Check) as surety in an amount of no less than ten percent (10%) of the Base Bid, payable to North Branch Area Community Schools, which will be forfeited if the undersigned fails to execute the contract in conformity with specifications stated herein.

B. The successful bidder further agrees to provide a Performance Bond in an amount equal to five percent (5%) of the total contract cost included in the bid submission.

### IV. CONTRACT PROVISIONS

If a contract is awarded, the selected contractor will be required to adhere to a set of general contract provisions which will become a part of any formal agreement.

#### 1. Reporting of Contractor

A. The Contractor is to report to North Branch Area Community Schools Facilities Manager and/or designee and will cooperate and confer as necessary to insure satisfactory work progress.

B. All reports, estimates, memoranda and documents submitted by the Contractor must be dated and bear the Contractor's name.

C. All reports made in connection with these services are subject to review and final approval by the Facilities Manager prior to payment.

D. North Branch Area Community Schools may review and inspect the Contractor's activities during the term of this contract.

F. Lien waivers must be put in place for all subcontractors and materials purchased.

G. Contractor is responsible for all expenses related to transportation of staff, equipment and materials and disposal of debris.

H. Contract must secure all necessary permits according to local and state laws and regulations.

## 2. Personnel

A. The Contractor will not hire any North Branch Area Community Schools employees for any of the required services without the North Branch Area Community Schools written approval in advance.

B. The parties agree that the Contractor is neither an employee nor an agent of North Branch Area Community Schools for any purpose.

## 3 Indemnification Agreement

The Contractor will protect, defend and indemnify North Branch Area Community Schools, its officers, agents, assigns, volunteers and employees from any and all liabilities, claims, liens, fines, demands and costs, including legal fees, of whatsoever kind and nature which may result in injury or death to any persons, including the Contractor's own employees, and for loss or damage to any property, including property owned or in the care, custody or control of North Branch Area Community Schools in connection with or in any way incident to or arising out of the occupancy, use service, operations, performance or non-performance of work in connection with this contract resulting in whole or in part from negligent acts or omissions of contractor, any sub-contractor, or any employee, agent or representative of the contractor or any sub-contractor.

## 4. Insurance Requirements

A. The Contractor will maintain at its own expense during the term of this Contract, the following insurance: Workers' Compensation insurance with Michigan statutory limits and Employers Liability Insurance with a minimum limit of \$100,000 each accident for any employee.

B. Commercial General Liability insurance with a combined single limit of \$1,000,000 each occurrence for bodily injury and property damage. The Township shall be added as "additional insured" on general liability policy with respect to the services provided under this contract.

C. Automobile Liability Insurance covering all owned, hired and non-owned vehicles with Personal Protection Insurance and Property Protection Insurance, including residual liability insurance with a minimum combined single limit of \$1,000,000 each accident for bodily injury and property damage.

D. Contractor shall furnish North Branch Area Community Schools with satisfactory certificates of insurance or a certified copy of the policy, if requested.

No payments will be made to the Contractor until the current certificates of insurance have been received and approved by North Branch Area Community Schools. If the insurance as evidenced by the certificates furnished by the

Contractor expires or is canceled during the term of the contract, services and related payments will be suspended. Contractor shall furnish North Branch Area Community Schools with certification of insurance evidencing such coverage and endorsements at least ten (10) working days prior to the commencement of services under this contract and shall provide for 30-day written notice to the Certificate holder of cancellation of coverage.

**5. Warranty**

North Branch Area Community Schools requires a one-year warranty on labor.

**6. Compliance with Laws and Regulations**

The Contractor will comply with all federal, state and local regulations, including but not limited to all applicable OSHA requirements and the Americans with Disabilities Act.

**7. Interest of Contractor and North Branch Area Community Schools**

The Contractor promises that it has no interest which would conflict with the performance or services required by this contract. The Contractor also promises that in the performance of this contract, no officer, agent, employee of North Branch Area Community Schools or member of its governing body, may participate in any decision relating to this contract which affects his/her personal interest or the interest of any corporation, partnership or association in which he/she is directly or indirectly interested or has any personal or pecuniary interest.

**8. Equal Employment Opportunity**

The Contractor will not discriminate against any employee or applicant for employment because of race, creed, color, sex, sexual orientation, national origin, physical handicap, age, height, weight, marital status, veteran status, religion and political belief (except as it relates to a bona fide occupational qualification reasonably necessary to the normal operation of the business).

**9. Payroll Taxes**

The Contractor is responsible for all applicable state and federal social security benefits and unemployment taxes and agrees to indemnify and protect North Branch Area Community Schools against such liability.

## **V. TERMS AND CONDITIONS**

**1. Award:**

North Branch Area Community Schools reserves the right to reject any and all bids received as a result of this RFB.

**2. Low Bid:** A successful contract will be awarded by the response given on the Bid Sheet to the most responsive and responsible respondent.

**3. Term of Bid:**

The Bid is for a six (6) month period from the date of award.

**4. Bid Submission:**

Submit Bid Cover page, Bid Signature Page, Contractor Information (page 2, II) and Bid Security/Performance Bond by required time/date. Bids must be submitted by mail or hand delivered to North Branch Area Community Schools Central Office at 6655 Jefferson St, North Branch MI 48461 by 2:00pm on June 21, 2023. Mailing address is P.O. Box 3620, North Branch, MI 48461

**5. Questions:**

Submit all project questions to Owner's Representative: Jeff Drayton, Director of Operations, 810-688-3570 ext 2708, [jdrayton@nbbrncos.net](mailto:jdrayton@nbbrncos.net)

**VI. PROPOSAL FORM/ALL TRADES**

**PROJECT:**

North Branch Area Community Sports Complex Restroom Building

\_\_\_\_\_  
Name of Contractor

\_\_\_\_\_  
Address, City, Zip

\_\_\_\_\_  
Phone #/Fax #

\_\_\_\_\_  
Email Address

**PROPOSAL**

Pursuant to and in compliance with the Invitation to Bid and the Instructions to Bidders, and having carefully examined the Bidding Documents with the Owner to complete the work in accordance with the said Bidding Documents for the sum of:

\_\_\_\_\_  
(Sum to be written out)

\_\_\_\_\_ Dollar \$ \_\_\_\_\_

Anticipated Completion Date: \_\_\_\_\_

BREAKDOWN OF BASE PROPOSAL:

SITE WORK	(\$_____ )DOLLARS
FOUNDATIONS	(\$_____ )DOLLARS
CONCRETE FLAT WORK	(\$_____ )DOLLARS
MASONRY	(\$_____ )DOLLARS
ROUGH CARPENTRY	(\$_____ )DOLLARS
INTERIOR CARPENTRY	(\$_____ )DOLLARS
FLOOR FINISHING	(\$_____ )DOLLARS
DOORS AND HARDWARE	(\$_____ )DOLLARS
PAINTING	(\$_____ )DOLLARS
MILLWORK	(\$_____ )DOLLARS
ROOFING	(\$_____ )DOLLARS
TOILET PARTITIONS	(\$_____ )DOLLARS
SIGNAGE	(\$_____ )DOLLARS
PLUMBING	(\$_____ )DOLLARS
HVAC	(\$_____ )DOLLARS
ELECTRICAL	(\$_____ )DOLLARS
GENERAL CONDITIONS	(\$_____ )DOLLARS
OVERHEAD & PROFIT	(\$_____ )DOLLARS
BASE PROPOSAL BID	(\$_____ )DOLLARS

ALTERNATES

The undersigned further proposes to execute the work specified in the respective technical division or indicated on the drawings for the sum added to the base proposal as stated below:

VOLUNTARY ALTERNATES

The following voluntary alternates are offered by the bidder. The undersigned agrees the amounts indicated below shall be added to or deducted from the Base Bid, as the case may be, for each alternate which is accepted.

	Description of <u>Voluntary Alternates</u>	<u>Add</u>	<u>Deduct</u>
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____

**SPECIAL PROVISIONS**  
**North Branch Area School District Sports**  
**Complex Restroom Building**

**SECTION 1: SCOPE OF WORK**

Work scope: The work includes, but is not limited to construction of a masonry building that will provide restroom facilities at North Branch Area Community Schools Softball Fields, which includes grading, construction, electrical, mechanical and sewer, along with all appurtenant work necessary to complete the project as stated in the plans and bid specifications.

**SECTION 2: NOTICE TO PROCEED AND TIME SCHEDULE**

An official "Notice to Proceed" specifying the date by which construction operations shall be started will be issued in writing and delivered to the CONTRACTOR by North Branch Area Community Schools upon approval by the North Branch Area Community Schools School Board and when all appropriate bonds and contracts have been signed and returned to North Branch Area Community Schools. Contract time will begin on the date specified in the "Notice to Proceed", unless operations begin at an earlier date, in which case the date that such operations begin will apply. The CONTRACTOR shall immediately begin and diligently prosecute the work to completion. The CONTRACTOR shall obligate himself to complete the work within the stated time limits. The CONTRACTOR shall begin work and shall diligently prosecute same to completion of the work from the date of commencement order, without fail and in the manner as stated in said specifications. All work described in this document shall be completed by September 17, 2023.

**SECTION 3: EXCUSABLE DELAYS**

The Contractor shall not be assessed with liquidated damage nor the cost of engineering inspection during any delay in the completion of the work caused by acts of God, the public enemy, fire, floods, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather, or due to such causes, provided that the Contractor shall within ten (10) days from the beginning of such delay notify the Project Manager in writing of the causes of delay. The Project Manager's findings of the facts thereon shall be final and conclusive.

**SECTION 4: INTENT OF THE PLANS AND SPECIFICATIONS**

The intent of the plans and specifications is to prescribe a complete outline of work which the Contractor undertakes to do in full compliance with the contract.

He shall furnish all required materials, equipment, tools, labor and incidentals, unless otherwise provided in the contract and shall include the cost of these items in the contract unit prices for the several units of work. All items of work called for on the plans or in the specifications and not included as a separate item in the proposal shall be considered as incidental to the other items listed in the proposal and the payment for such incidental items shall be considered as included in the contract bid.

**SECTION 5: AUTHORITY OF THE PROJECT MANAGER AND INSPECTOR**

All work shall be done under the supervision of North Branch Area Community Schools Facilities Manager acting on behalf of North Branch Area Community Schools. He shall decide all questions which arise as to the quality and acceptability of materials furnished, work performed, manner of performance, rates of progress, interpretation of the plans and specifications, acceptable fulfillment of the contract and compensation under the specifications. He shall determine the amount of work performed and materials furnished and his decision and estimate shall be final. His estimate shall be "condition precedent" to the right of the Contractor to receive money due him under the contract.

**SECTION 6: CHANGE ORDERS**



North Branch Area Community Schools reserves the right to make alterations or supplements to the Contract. Change Order Forms are required for all changes in decreases and/or increases of quantities and/or dollar amount changes

#### SECTION 7: COOPERATION WITH OTHER CONTRACTORS

The Contractor shall cooperate with other Contractors who may be employed North Branch Area Community Schools on construction of other work adjacent to or in the proximity of the location of the project.

#### SECTION 8: CONTRACTOR AND SUBCONTRACTOR RESPONSIBILITY, QUALIFICATIONS, AND LICENSE.

The Contractor and Subcontractors shall hold current licenses from the State Of Michigan. Licenses.

**SPECIFICATIONS**  
North Branch Area Community Schools  
Sports Complex Restroom Building

SECTION 00010 - PROJECT SPECIFICATIONS INDEX

DIVISION 1    GENERAL REQUIREMENTS

- 011000 Summary
- 012100 Allowances
- 012600 Contract Modifications
- 012900 Payment Procedures
- 013100 Project Management
- 013200 Construction Progress Docs
- 013300 Submittal Procedures
- 015000 Temporary Facilities
- 016000 Product Requirements
- 017300 Execution
- 017700 Closeout Procedures
- 017823 Operation and Maintenance
- 017839 Project Record Documents

DIVISION 2    SITEWORK  
                    Not Used

DIVISION 3    CONCRETE

- 031000    Concrete Formwork
- 032000    Concrete Reinforcement
- 033000    Cast-in-Place Concrete
- 033450    Concrete Finishing

DIVISION 4    MASONRY

- 040650    Masonry Mortar & Grout
- 042200    Concrete Unit Masonry

DIVISION 5 METALS  
                    Not Used

DIVISION 6    WOOD AND PLASTICS

- 061000    Rough Carpentry
- 061900    Wood Trusses

DIVISION 7    THERMAL AND MOISTURE PROTECTION

- 071416    Cold Fluid-Applied Water Proofing
- 074113    Metal Roof Panels
- 079200    Joint Sealants

DIVISION 8    DOORS AND WINDOWS

- 081113    Hollow Metal Doors and Frames
- 083113    Access Door and Frames
- 087100    Door Hardware

DIVISION 9    FINISHES

- 099113    Exterior Painting

099123	Interior Painting
099600	Anti-Graffiti Coatings
DIVISION 10	SPECIALTIES
101423	Building Signage
102113	Toilet Compartments
102800	Toilet and Bath Accessories
DIVISION 11	EQUIPMENT
	Not Used
DIVISION 12	FURNISHINGS
	Not Used
DIVISION 13	SPECIAL CONSTRUCTION
	Not used
DIVISION 14	CONVEYING SYSTEMS
	Not used
DIVISION 22	PLUMBING
220000	Plumbing
220100	Operation and Maintenance Plumbing
220500	Common Work Results for Plumbing
220700	Plumbing Insulation
221000	Facility Water Distribution
221300	Facility Sanitary Sewerage
224000	Plumbing Fixtures and Trim
DIVISION 23	MECHANICAL
230700	HVAC Insulation
233100	HVAC Ducts
233700	Air Outlets and Inlets
DIVISION 26	ELECTRICAL
	See Drawings
DIVISION 31	EARTHWORK
312001	Structural Earthwork
DIVISION 32	EXTERIOR IMPROVEMENTS
	See Civil Drawings

## SECTION 011000 - SUMMARY

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Project information.
  - 2. Work covered by Contract Documents.
  - 3. Access to site.
  - 4. Coordination with occupants.
  - 5. Work restrictions.
  - 6. Specification and drawing conventions.

- B. Related Requirements:

- 1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

#### 1.3 PROJECT INFORMATION

- A. Project Identification: North Branch Area School District Sport Complex Restroom Building

- 1. Project Location: 6598 Brush St, North Branch, MI 48461.

- B. Owner: North Branch Area School District.

- 1. Owner's Representative: Jeff Drayton, Director of Operations, 810-688-3570 ext 2708, [jdrayton@nbbronzos.net](mailto:jdrayton@nbbronzos.net)

- C. Architect: Creekwood Architecture, Inc., 1111 Creekwood Tr., Burton, MI 48509

- 1. Jeffrey J Van Camp, AIA; 810-742-0480; [jvancamp@creekwoodarch.com](mailto:jvancamp@creekwoodarch.com)

#### 1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of, but is not limited to the following:

- 1. 793 square foot Restroom/Storage building: Concrete footings, slab-on-grad, non-insulated CMU exterior walls, wood trusses, metal roof, hollow metal doors and frames, electronic door hardware, interior finishes, solid plastic toilet partitions, plumbing, HVAC, and electrical.

- B. Type of Contract:
    - 1. Project will be constructed under a single contract.
- 1.5 ACCESS TO SITE
- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
  - B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
    - 1. Limits: Confine construction operations to area of work as shown on drawings.
    - 2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
      - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- 1.6 COORDINATION WITH OCCUPANTS
- A. Full Owner Occupancy: Owner will occupy site and existing facilities during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
    - 1. Maintain access to existing walkways, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
    - 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- 1.7 WORK RESTRICTIONS
- A. Work Restrictions, General: Comply with restrictions on construction operations.
    - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
  - B. On-Site Work Hours: Limit on site to normal business working hours of 7:00 a.m. to 7:00 p.m., Monday through Saturday, unless otherwise indicated.
    - 1. Weekend Hours/Holidays: Weekend work not allowed on Sunday. Work not allowed on Holidays recognized by the City of Sparks.
  - C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
    - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
    - 2. Obtain Owner's written permission before proceeding with utility interruptions.
  - D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
    - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
    - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- 1.8 SPECIFICATION AND DRAWING CONVENTIONS
- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
    - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
    - 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
  - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

## SECTION 012100 – NOT USED

## SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

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

#### 1.3 MINOR CHANGES IN THE WORK

- A. Owners Representative will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Owners Representative's Supplemental Instructions."

#### 1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Owners Representative will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Work Change Proposal Requests issued by Owners Representative are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
    - e. Quotation Form: Use forms acceptable to Owners Representative.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Owners Representative.
  - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Include costs of labor and supervision directly attributable to the change.
  - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times,

and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Proposal Request Form: Use form acceptable to Owners Representative.

#### 1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

#### 1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Owners Representative will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

#### 1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Owners Representative may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
  1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600



## SECTION 012900 - PAYMENT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
  - 2. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 3. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

#### 1.3 DEFINITIONS

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

#### 1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with continuation sheets.
    - b. Submittal schedule.
    - c. Items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Owners Representative at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Contractor's name and address.
    - c. Date of submittal.
  - 2. Arrange schedule of values consistent with format of AIA Document G703.
  - 3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
    - a. Related Specification Section or Division.
    - b. Description of the Work.
    - c. Name of subcontractor.
    - d. Name of manufacturer or fabricator.
    - e. Name of supplier.
    - f. Change Orders (numbers) that affect value.
    - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
      - 1) Labor.
      - 2) Materials.

- 3) Equipment.
  4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
  5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
    - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
  7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
  8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
    - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
  9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.
- 1.5 APPLICATIONS FOR PAYMENT
- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Owners Representative and paid for by Owner.
    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
  - B. Payment Application Times: Submit Application for Payment to Owners Representative by the 25th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
    1. Submit draft copy of Application for Payment seven days prior to due date for review by Owners Representative.
  - C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
  - D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Owners Representative will return incomplete applications without action.
    1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
    2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
    3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
    4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
  - E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
    1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
    2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
    3. Provide summary documentation for stored materials indicating the following:
      - a. Value of materials previously stored and remaining stored as of date of previous

- Applications for Payment.
  - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
  - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Owners Representative by a method ensuring receipt. One copy shall include waivers of lien and similar attachments if required.
  - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
  - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  - 2. When an application shows completion of an item, submit conditional final or full waivers.
  - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  - 4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
  - 1. List of subcontractors.
  - 2. Schedule of values.
  - 3. Contractor's construction schedule (preliminary if not final).
  - 4. List of Contractor's staff assignments.
  - 5. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  - 6. Certificates of insurance and insurance policies.
  - 7. Performance and payment bonds.
  - 8. Data needed to acquire Owner's insurance.
- I. Application for Payment at Substantial Completion: After Owners Representative issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
  - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  - 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
  - 1. Evidence of completion of Project closeout requirements.
  - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  - 3. Updated final statement, accounting for final changes to the Contract Sum.
  - 4. Evidence that claims have been settled.
  - 5. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

## SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

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

#### 1.3 DEFINITIONS

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

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

#### 1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

- 1.6 REQUESTS FOR INFORMATION (RFIs)
- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Owners Representative will return RFIs submitted to Owners Representative by other entities controlled by Contractor with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Owners Representative.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Owners Representative 's Action: Owners Representative will review each RFI, determine action required, and respond. Allow seven working days for Owners Representative 's response for each RFI. RFIs received by Owners Representative after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Owners Representative 's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Owners Representative 's action may include a request for additional information, in which case Owners Representative 's time for response will date from time of receipt of additional information.
  3. Owners Representative 's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Owners Representative in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:
1. Project name.
  2. Name and address of Contractor.

3. Name and address of Owners Representative.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Owners Representative 's response was received.
- F. On receipt of Owners Representative 's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Owners Representative within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

## SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Contractor's construction schedule.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting schedules and reports.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. PDF electronic file.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

#### 1.4 COORDINATION

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

### PART 2 - PRODUCTS

#### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
  - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  - 3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  - 4. Startup and Testing Time: Include no fewer than 7 days for startup and testing.
  - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Owners Representative's administrative procedures necessary for certification of Substantial Completion.
  - 6. Punch List and Final Completion: Include not more than 14 days for completion of punch list items and final completion.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities.
  - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  - 2. As the Work progresses, indicate final completion percentage for each activity
- B. Distribution: Distribute copies of approved schedule to Owners Representative Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200



## SECTION 013300 - SUBMITTAL PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

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

#### 1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Owners Representative's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

#### 1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Owners Representative and additional time for handling and reviewing submittals required by those corrections.
  - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead

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

#### 1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Owners Representative 's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Owners Representative for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 3. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Owners Representative 's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Owners Representative will advise Contractor when a submittal being processed must be delayed for coordination.
  - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  - 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
  - 4. Sequential Review: Where sequential review of submittals by Owners Representative 's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
  - 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  - 2. Name file with submittal number or other unique identifier, including revision identifier.
    - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
  - 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Owners Representative.
  - 4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:

- a. Project name.
  - b. Date.
  - c. Name and address of Owners Representative.
  - d. Name of Contractor.
  - e. Name of firm or entity that prepared submittal.
  - f. Names of subcontractor, manufacturer, and supplier.
  - g. Category and type of submittal.
  - h. Submittal purpose and description.
  - i. Specification Section number and title.
  - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
  - k. Drawing number and detail references, as appropriate.
  - l. Location(s) where product is to be installed, as appropriate.
  - m. Related physical samples submitted directly.
  - n. Indication of full or partial submittal.
  - o. Transmittal number-numbered consecutively.
  - p. Submittal and transmittal distribution record.
  - q. Other necessary identification.
  - r. Remarks.
- E. Options: Identify options requiring selection by Owners Representative.
  - F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Owners Representative on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
  - G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
    - 1. Note date and content of previous submittal.
    - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
    - 3. Resubmit submittals until they are marked with approval notation from Owners Representative 's action stamp.
  - H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
  - I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Owners Representative 's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Submit electronic submittals via email as PDF electronic files.
    - a. Owners Representative will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
  - 4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.

- b. Printed performance curves.
  - c. Operational range diagrams.
  - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
- 5. Submit Product Data before or concurrent with Samples.
- 6. Submit Product Data in the following format:
  - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
  - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Notation of coordination requirements.
    - d. Notation of dimensions established by field measurement.
    - e. Relationship and attachment to adjoining construction clearly indicated.
    - f. Seal and signature of professional engineer if specified.
  - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches , but no larger than 30 by 42 inches .
  - 3. Submit Shop Drawings in the following format:
    - a. PDF electronic file.
- D. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- E. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- F. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- G. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

### PART 3 - EXECUTION

#### 3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Owners Representative.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

#### 3.2 Owners Representative 'S ACTION

- A. Informational Submittals: Owners Representative will review each submittal and will not return it, or will return it if it does not comply with requirements. Owners Representative will forward each submittal to appropriate party.
- B. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Owners Representative.
- C. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- D. Submittals not required by the Contract Documents may be returned by the Owners Representative without action.

END OF SECTION 013300

## SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

#### 1.4 QUALITY ASSURANCE

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

#### 1.5 PROJECT CONDITIONS

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

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

NOT USED

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
  - B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- 3.2 SECURITY AND PROTECTION FACILITIES INSTALLATION
- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
  - B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
    1. Comply with work restrictions specified in Section 011000 "Summary."
  - C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- 3.3 OPERATION, TERMINATION, AND REMOVAL
- A. Maintenance: Maintain facilities in good operating condition until removal.
  - B. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
    1. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

## SECTION 016000 - PRODUCT REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 012100 "Allowances" for products selected under an allowance.

#### 1.3 DEFINITIONS

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

#### 1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Owners Representative's Action: If necessary, Owners Representative will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Owners Representative will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
    - a. Use product specified if Owners Representative does not issue a decision on use of a comparable product request within time allocated.

#### 1.5 QUALITY ASSURANCE

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

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

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
  1. Store products to allow for inspection and measurement of quantity or counting of units.
  2. Store materials in a manner that will not endanger Project structure.
  3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  6. Protect stored products from damage and liquids from freezing.
- 1.7 PRODUCT WARRANTIES
  - A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
    1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
    2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
  - B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
    1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
    2. See other Sections for specific content requirements and particular requirements for submitting special warranties.
  - C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

## PART 2 - PRODUCTS

- 2.1 PRODUCT SELECTION PROCEDURES
  - A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
    1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
    2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
    3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
    4. Where products are accompanied by the term "as selected," Owners Representative will make selection.
    5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
    6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved."
  - B. Product Selection Procedures:
    1. Products:
      - a. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements.
    2. Manufacturers:
      - a. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements.

## 2.2 COMPARABLE PRODUCTS



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

PART 3 - EXECUTION (Not Used)  
END OF SECTION 016000

## SECTION 017300 - EXECUTION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. Installation of the Work.
  - 4. Cutting and patching.
  - 5. Progress cleaning.
  - 6. Starting and adjusting.
  - 7. Protection of installed construction.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for limits on use of Project site.
  - 2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
  - 3. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.

#### 1.3 DEFINITIONS

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

#### 1.4 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Irrigation Control systems.
    - b. Underground Communication systems.
    - c. Underground Electrical wiring systems.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Owners Representative according to requirements in Section 013100 "Project Management and Coordination."

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Owners Representative promptly.
- B. General: Lay out the Work using accepted surveying practices.
  - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  - 2. Establish limits on use of Project site.
  - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 4. Inform installers of lines and levels to which they must comply.
  - 5. Check the location, level and plumb, of every major element as the Work progresses.
  - 6. Notify Owners Representative when deviations from required lines and levels exceed allowable tolerances.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and

topsoil placement, utility slopes, and rim and invert elevations.

- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

### 3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Owners Representative. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Owners Representative before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

### 3.5 INSTALLATION

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

### 3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- D. Existing Utility Services and Control/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
  - 5. Proceed with patching after construction operations requiring cutting are complete.
- F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
- G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000

"Temporary Facilities and Controls."

- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
  - I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
  - J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- 3.8      STARTING AND ADJUSTING
- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
  - B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
  - C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- 3.9      PROTECTION OF INSTALLED CONSTRUCTION
- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
  - B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

## SECTION 017700 - CLOSEOUT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B. Related Requirements:
  - 1. Section 017300 "Execution" for progress cleaning of Project site.
  - 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

#### 1.3 ACTION SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at Final Completion.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.

#### 1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit test/adjust/balance records.
  - 5. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Advise Owner of pending insurance changeover requirements.
  - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment.
  4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
  5. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  6. Complete final cleaning requirements, including touchup painting.
  7. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Owners Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. Owners Representative will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Owners Representative, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
  2. Results of completed inspection will form the basis of requirements for final completion.
- 1.6 FINAL COMPLETION PROCEDURES
- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
  2. Certified List of Incomplete Items: Submit certified copy of Owners Representative's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owners Representative. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Owners Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. Owners Representative will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
- 1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)
- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first.
  2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Owners Representative.
    - d. Name of Contractor.
    - e. Page number.
  4. Submit list of incomplete items in the following format:
    - a. PDF electronic file. Owners Representative will return annotated file.
- 1.8 SUBMITTAL OF PROJECT WARRANTIES
- A. Time of Submittal: Submit written warranties on request of Owners Representative for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of



Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
  2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - c. Remove snow and ice to provide safe access to building.
    - d. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - e. Sweep concrete floors broom clean in unoccupied spaces.
    - f. Remove labels that are not permanent.
    - g. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    - h. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    - i. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    - j. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
    - k. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
    - l. Leave Project clean and ready for occupancy.

### 3.2 REPAIR OF THE WORK

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

Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
  - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

## SECTION 017823 - OPERATION AND MAINTENANCE DATA

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation manuals for systems, subsystems, and equipment.
  - 2. Product maintenance manuals.
  - 3. Systems and equipment maintenance manuals.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

#### 1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Owners Representative will comment on whether content of operations and maintenance submittals are acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
  - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Owners Representative.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    - b. Enable inserted reviewer Comments on draft submittals.
  - 2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Owners Representative will return three copies.
- C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Owners Representative will return copy with comments.
  - 1. Correct or revise each manual to comply with Owners Representative's comments. Submit copies of each corrected manual within 15 days of receipt of Owners Representative's comments and prior to commencing demonstration and training.

### PART 2 - PRODUCTS

#### 2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.

3. Manual contents.
- B. Title Page: Include the following information:
  1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name and contact information for Contractor.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
  1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
  1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
  1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, subject matter of contents. Indicate volume number for multiple-volume sets.
  2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
  4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
  5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.2 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  - 2. Operating standards.
  - 3. Operating procedures.
  - 4. Wiring diagrams.
  - 5. Control diagrams.
  - 6. Piped system diagrams.
  - 7. Precautions against improper use.
- B. Descriptions: Include the following:
  - 1. Product name and model number. Use designations for products indicated on Contract Documents.
  - 2. Manufacturer's name.
  - 3. Equipment identification with serial number of each component.
  - 4. Equipment function.
  - 5. Operating characteristics.
  - 6. Limiting conditions.
  - 7. Performance curves.
  - 8. Engineering data and tests.
  - 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
  - 1. Startup procedures.
  - 2. Equipment or system break-in procedures.
  - 3. Routine and normal operating instructions.
  - 4. Regulation and control procedures.
  - 5. Instructions on stopping.
  - 6. Normal shutdown instructions.
  - 7. Seasonal and weekend operating instructions.
  - 8. Required sequences for electric or electronic systems.
  - 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## 2.3 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.
  - 4. Material and chemical composition.
  - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.

5. Repair instructions.
  - E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
  - F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
    1. Include procedures to follow and required notifications for warranty claims.
- 2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS
- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
  - B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
  - C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
    1. Standard maintenance instructions and bulletins.
    2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
    3. Identification and nomenclature of parts and components.
    4. List of items recommended to be stocked as spare parts.
  - D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
    1. Test and inspection instructions.
    2. Troubleshooting guide.
    3. Precautions against improper maintenance.
    4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    5. Aligning, adjusting, and checking instructions.
    6. Demonstration and training video recording, if available.
  - E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
    1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
    2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
  - F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
  - G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
  - H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
    1. Include procedures to follow and required notifications for warranty claims.

## PART 3 - EXECUTION

### 3.1 MANUAL PREPARATION

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of operation and maintenance manuals.
  2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

## SECTION 017839 - PROJECT RECORD DOCUMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
- B. Related Requirements:
  - 1. Section 017300 "Execution" for final property survey.
  - 2. Section 017700 "Closeout Procedures" for general closeout procedures.
  - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

#### 1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set(s) of marked-up record prints.
    - a. Owners Representative will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
- B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.

### PART 2 - PRODUCTS

#### 2.1 RECORD DRAWINGS

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



- n. Record information on the Work that is shown only schematically.
  - 3. Mark the Contract Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  - 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  - 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
  - B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
    - 1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
    - 2. Identification: As follows:
      - a. Project name.
      - b. Date.
      - c. Designation "PROJECT RECORD DRAWINGS."
      - d. Name of Owners Representative.
      - e. Name of Contractor.
- 2.2 RECORD SPECIFICATIONS
- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
    - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - B. Format: Submit record Specifications as paper copy.

## PART 3 - EXECUTION

### 3.1 RECORDING AND MAINTENANCE

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

END OF SECTION 017839

## SECTION 031000 - CONCRETE FORMWORK

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. General Requirements:
  - 1. Drawings and general provisions of the Contract Documents including General, Special and other Conditions and Division 01, "General Requirements" Sections, apply to the work specified in this Section.
- B. General Scope of Work:
  - 1. Provide formwork and accessories in accordance with provisions of this Section for cast-in-place concrete shown on the Drawings or required by other Sections of these Specifications.
- C. Related work:
  - 1. Section 032000: Concrete reinforcement.
  - 2. Section 033000: Cast-in-place concrete.

#### 1.2 QUALITY ASSURANCE

- A. Use adequate numbers 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. Design of formwork is the Contractor's responsibility.
- C. Standards:
  - 1. Concrete work shall comply with the requirements of ACI 301, "Specifications for Structural Concrete for Buildings", latest edition.
  - 2. Items not otherwise specified shall comply with ACI Standard 347, "Recommended Practice for Concrete Formwork", latest edition.
- D. Allowable Tolerances in Formwork:
  - 1. Construct formwork to provide completed cast-in-place concrete surfaces complying with the tolerances specified in ACI 347.
  - 2. Before concrete placement, check the lines and levels of erected formwork. Make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems.
  - 3. During concrete placement, check formwork and related supports to ensure that forms are not displaced and that completed work will be within specified tolerances.
  - 4. Refer to Structural Drawings for additional requirements.
- E. Inspections:
  - 1. See drawings and general provisions of the Contract Documents including General, Special and other Conditions and Division 01, "General Requirements" Sections, apply to the work specified in this Section.
  - 2. See requirements for inspection as stated in Part 3 of this section.

#### 1.3 SUBMITTALS

- A. Submit manufacturer's specifications and installation instructions for products specified. Include manufacturer's certification as may be required to show compliance with these specifications.

#### 1.4 JOB CONDITIONS

- A. LOADING STRUCTURES
  - 1. Protect all in-place structures from excessive loading.
  - 2. Shore and brace as necessary to prevent all damage.
- B. SCHEDULING
  - 1. Contractor shall provide and erect sufficient forms so that the work of placing concrete will proceed at a rate to insure maintaining a schedule so that the time of the inspector shall be as continuous as practicable.

### PART 2 - PRODUCTS

## 2.1 MATERIALS

### A. GENERAL

1. Except for metal forms, use new materials. Materials may be re-used during progress of the Work, provided they are completely cleaned and reconditioned, recoated for each use, and capable of producing formwork of the required quality.

### B. EARTH FORMS

1. Side forms for footings may be omitted, and concrete may be placed directly against excavation

### C. FORM MATERIALS

1. Plywood:
  - a. APA Exterior "B-B" "Plyform" grade Douglas Fir veneer panel with medium density overlaid one side grade; sound, undamaged sheets with clean, true edges; conform to Product Standard PS 1. Use for all exposed concrete surfaces.
  - b. Panel thickness and placing as required to support concrete in accordance with referenced standards; minimum  $\frac{3}{4}$ " thickness.
  - c. All panels edge sealed; Both faces of general use panels shall be factory sealed with colorless coating which will not affect application of applied finishes or protective coatings; form oil not permitted.
2. Lumber for Forms:
  - a. For concealed concrete surfaces including footings and foundations, use "Standard" or better grade Douglas Fir, T&G or shiplap, surface 1 side, 2 edges, not wider than 8", secured to wood or steel stakes, substantially constructed to shapes indicated and to support the required loads.
  - b. For studs, wales, and supports, use S4S surfaced "Standard" or better grade Douglas Fir lumber, dimensions as required to support the loads, but not less than 2x4 inch size.
3. Flat Steel Forms:
  - a. Approved type steel forms may be used in lieu of wood and plywood, at the Contractor's option.
4. Tube Forms:
  - a. For round columns furnish fiber, fiberglass, or metal tube forms of diameters required, capable of withstanding continuous pour full height and providing a finished surface free of spiral markings.

### D. ACCESSORIES

1. Form Ties:
  - a. Removable form bolts with coil ties, or snap ties.
  - b. Either system shall have cone spreaders and tie metal shall be  $\frac{3}{4}$ " minimum back of concrete face.
2. Screed Chairs:
  - a. Approved type for slab screeds.
3. Chamfer Strips:
  - a. Wood or PVC strips,  $\frac{3}{4}$  x  $\frac{3}{4}$  inch size of maximum possible lengths.
4. Control Joints:
  - a. For interior slabs, where not otherwise provided by saw cutting, furnish Greenstreak Plastic Products "Zipcap Control-joint Former", or approved, minimum 10-foot lengths, 1" depth for installation in new interior slabs.
5. Expansion Joints:
  - a. For Interior Slabs: Meadows "Seal Tight" self-expanding cork,  $\frac{1}{2}$ " thick by depth of slab less  $\frac{1}{4}$ ", conforming to ASTM D1752, Type 3 (AASHTO M153-Type II), or approved equal.
6. Nails, Spikes, Lag Bolts, Thru-Bolts, Anchorages:
  - a. Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
7. Joint Sealant:
  - a. As specified in Section 033000.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.
- B. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.2 INSTALLATION

- A. General:
  - 1. Install concrete work in accordance with ACI 301 except as amended by this Section.
- B. Earth Forms:
  - 1. Where permitted, hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.
- C. Construction - Formwork:
  - 1. General:
    - a. Construct formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 347. Construct so concrete members and structures are of correct sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, level, and plumb work in the finished structure.
    - b. Make reasonably tight to prevent excess leakage of cement paste during concrete placement. Solidly butt joints, and provide backup material at joints as required to prevent leakage and prevent fins. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to over-stressing by construction loads.
    - c. Do not damage concrete during stripping. Permit removal of remaining principal shores.
  - 2. Fabrication:
    - a. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
    - b. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
    - c. Locate studs and joists not farther apart than 12 inches o.c. Horizontal form wales spaced not to exceed 2 feet o.c.
  - 3. Form Ties:
    - a. Hold inner and outer forms for vertical concrete together with combination steel ties and spreaders as approved by Owners Representative.
    - b. Space wall form ties not over 4 feet apart horizontally and 2 feet apart vertically. Space ties symmetrically in tiers and rows, each tier plumb from top to bottom and each row level. Form tie placement in formed walls where wall surface will be left exposed in the finished work, shall be uniformly spaced and aligned within the following tolerance:
      - Tie alignment, horizontally and vertically along each wall plane, shall occur no more than  $\frac{1}{4}$ " from a straight line measured between first and last tie along any line, and no more than  $\frac{1}{4}$ " variance in alignment between any to adjacent ties.
    - c. At horizontal pour lines, locate ties not more than 6" below the pour lines. Tighten after concrete has set and before the next pour is made.
    - d. For exposed concrete surfaces, install form ties of removable type with she-bolts equipped with permanent plugs and a system approved by Owners Representative for fixing the plug in place.
  - 4. Forms for Exposed Concrete:
    - a. Drill forms to suit ties being used, and to prevent leakage of cement paste around the holes. Do not splinter forms by driving ties through improperly prepared holes.
    - b. Provide sharp clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
    - c. Use extra studs, wales, and bracing to prevent objectionable bowing of forms between studs, and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.

5. Corner treatment:
  - a. Chamfer salient corners in exposed concrete unless otherwise noted or where flush with adjacent surfaces. Unless shown otherwise, form chamfers with 3/4" x 3/4" strips, accurately formed and surfaced to produce uniformly straight lines and tight edges.
  - b. Extend terminal edges to required limit, and miter the chamfer strips at changes in direction.
6. Provisions for Other Trades:
  - a. Provide openings in concrete formwork to accommodate work of other trades.
  - b. Verify size and location of openings, recesses, and chases with the trade requiring such items.
  - c. Accurately place and securely support items to be built into the concrete.

#### D. TREATMENT OF FORMS

- 1 Before placing the concrete, the contact surfaces of forms shall be coated with a suitable non-staining form coating compound or shall be given two coats of nitrocellulose lacquer. Mineral oil shall not be used on forms.
8. Excess coating shall be removed by wiping with cloths. Re-used forms shall have the contact surfaces cleaned thoroughly, those which have been coated shall be given an additional application of the coating.
9. Apply form coating material in strict accordance with manufacturer's recommendations.

#### E. JOINTS AND STOPPAGES

1. Expansion Joints:
  - a. Do not extend reinforcement trough where bonded on both sides of joint; smooth dowels may extend through joint. Position accurately and support against displacement in locations listed hereinafter.
  - b. Interior Work:
    - i. Install isolation/expansion joints between interior ground-supported slabs and building foundation walls when shown on Drawings, and at other locations where specifically shown or noted.
    - ii. Install joints with top surface recessed below finish elevation 1/4", and fill with joint sealer as specified in Section 033000, finished flush with slab surface.
  - c. Exterior Work:
    - i. Install as required in new walks and slabs in locations and/or spacings shown, elsewhere not more than 10 feet apart. Coordinate exact locations and alignment with Owners Representative.
    - ii. Install expansion joints between concrete walks/slabs and vertical building walls and retaining walls.
    - iii. Install at all other locations indicated.
    - iv. Install joints with top surface recessed below finish elevation 1/4", and fill with joint sealer as specified in Section 033000, finished flush with slab surface.
2. Control Joints:
  - a. Provide as detailed and in locations indicated, accurately placed to true straight lines and supported against displacement.
  - b. For exterior work, form with edging tool as specified in Section 033000.
  - c. For interior work, build control strips into forms or diamond-saw cut joints 1/8" wide by 1/5 the depth of the slab.
    - i. If sawing method is used, sawing shall be performed as soon as the concrete hardens sufficiently to prevent raveling of the concrete at the edges and before the concrete temperature is permitted to fall; perform cuts 4 – 8 hours after concrete is placed, as soon as the freshly placed concrete can be walked on.
    - ii. Contractor shall have at least one spare saw available during the sawing operation.

#### F. REMOVING FORMS AND SHORING

1. Ties:
  - a. Remove 4 days after pour. Fill holes with dry pack cement mortar as specified in Section 033000.
2. Forms:
  - a. Remove only after concrete has thoroughly hardened. Vertical forms may be removed 24 hours after pour where structure is supported on shores. Remove other forms no sooner than 7 days.
3. Shoring:
  - a. Remove shoring only on approval of Engineer but not before 28 days.
  - b. Shoring is required for any reinforced concrete structural component, except concrete slabs supported by structural steel framing.
  - c. Shoring for beams and slabs shall remain in place at all ties until all concrete work over has been completed; if necessary to remove any shoring in order to remove plywood forms, shoring so removed shall immediately be reinstalled to support all loads.
4. Finished Surfaces:
  - a. Exercise care in removing forms from finished concrete surfaces so that surfaces are not marred or gouged, and that corners are true, sharp, and unbroken.
  - b. Release sleeve nuts or clamps, and pull the form ties neatly.
  - c. Do not permit steel spreaders, form ties, or other metal to project from, or be visible on, any concrete surface except where so shown on Drawings.

#### 3.3 FIELD QUALITY CONTROL

##### A. INSPECTIONS

1. Testing will be performed as required by the International Building Code, as adopted by local jurisdiction, and these Specifications.
2. Inspections of formwork shall include configuration, form, and steel cleanliness.
3. Inspect erected formwork for conformance with approved drawings, for design and seal of form joints, and for type and location of form ties.

END OF SECTION 031000

## SECTION 032000 - CONCRETE REINFORCEMENT

### PART 1 - GENERAL

#### 3.1 DESCRIPTION

- A. Work included: Drawings and general provisions of The Contract Documents including General, Supplemental and other Conditions and Division 01, "General Requirements" Sections, apply to the work specified in this Section.
- B. Related work:
  - 1. Section 031000: Concrete formwork.
  - 2. Section 033000: Cast-in-place concrete.
  - 3. Section 042200: Unit Masonry.

#### 1.2 QUALITY ASSURANCE

- A. Comply with the pertinent provisions of the latest edition of the following, except as may be modified herein.
  - 1. ACI 318 "Building Code Requirements for Reinforced Concrete", hereinafter called "ACI 318".
  - 2. ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structures", hereinafter called "ACI 315".
  - 3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice".
- B. Inspections: Drawings and general provisions of the Contract Documents including General, Supplemental and other Conditions and Division 1.
- C. Use adequate numbers 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 in this Section.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

##### A. BAR REINFORCING STEEL

- 1. Unless otherwise specifically noted in Structural Notes, furnish deformed bars meeting requirements set forth in ASTM A615 minimum, Grade 60. Bars shall be unpainted, uncoated, and free from rust, dirt and loose scale.
- 2. Where reinforcing requires welded connections, furnish weldable reinforcing bars which meet the chemical requirements of ASTM A706 (Grade 60 ksi) with a minimum carbon equivalent of .55 percent.

##### B. WELDED STEEL WIRE FABRIC

- 1. Furnish welded wire fabric meeting requirements set forth in ASTM A185 and A82,  $F_y=65$  ksi.

##### C. FIBROUS SECONDARY REINFORCEMENT

- 1. General:
  - a. Use in all standard weight concrete mixes for interior and exterior slabs on grade.
  - b. Acceptable fibrous secondary reinforcement for slabs shall be polypropylene fiber which is inert to alkali and chemical attack; fiberglass fibers are not acceptable.
- 2. Length:
  - a. As recommended by fibrous reinforcing manufacturer; ranging between  $\frac{1}{2}$ " to  $\frac{3}{4}$ ".
- 3. Acceptable Products/Manufacturers:
  - a. "Nycon" as manufactured by Nycon Inc.
  - b. "Fibermesh" as manufactured by Fibermesh Co.
  - c. "Microfiber" as manufactured by W. R. Grace.

##### D. ACCESSORIES

- 1. General:
  - a. Use wire bar type supports complying with CRSI recommendations, unless

- otherwise shown on Drawings. Do not use wood, brick, or other non-complying material.
- b. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
- c. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with either hot-dip galvanized, plastic-protected legs, or stainless steel. In addition, portions of all accessories within  $\frac{3}{4}$ " of the concrete surface for painted or unpainted exposed concrete surfaces shall be stainless steel and bars shall be tied with stainless steel wire, whether for exterior or interior exposure.
- 2. Tie Wire:
  - a. 16 gauge or heavier, double annealed wire.
- 3. Spacer Bars for Wall Reinforcing:
  - a. No. 3 bars, "U" shaped. Stock items of equivalent function may be submitted for approval.
- 4. Mortar Blocks:
  - a. Furnish as required for use as spacers in placing reinforcement; shall be 2" square (maximum).
  - b. Mortar blocks shall be constructed of mortar mixed with the same proportions of sand and cement used in concrete, and develop a minimum compressive strength of 4,000 psi at 28 days.
  - c. Mortar blocks shall have a tie wire embedded and the protruding ends to be tied to the reinforcing steel to hold the mortar blocks in place; mortar blocks with a grooved top may be used for supporting steel in slabs.
  - d. Do not use wood, brick, or other non-complying material.
- 5. Metal Chair Supports:
  - a. In lieu of mortar blocks, furnish approved heavy-duty plastic-type chair supports, sized to support all slab steel to proper height and with cushioned pads to prevent vapor barrier membrane penetration.

## 2.2 FABRICATION

### A. General:

- 1. Fabricate reinforcing bars to conform to the required shapes and dimensions, with fabrication tolerances complying with the CRSI Manual.
- 2. In case of fabricating errors, do not straighten or rebend reinforcement in a manner that will weaken or injure the material.
- 3. Reinforcement with any of the following defects will not be acceptable.
  - a. Bar lengths, depths, and/or bends exceeding the specified fabrication tolerances;
  - b. Bends or kinks not shown on the Drawings;
  - c. Bars with reduced cross-section due to excessive rusting or other cause.

## PART 3 – EXECUTION

### 3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.2 INSTALLATION

#### A. Cleaning Reinforcement:

- 1. Clean reinforcement, at time concrete is placed, free of mud, oil, or other materials that will reduce the bond. Conform to ACI 318.

#### B. Placing & Fastening Reinforcement:

- 1. General:
  - a. Prevent water from softening soil under reinforcing during steel placing.
  - c. Conform to ACI 318 for placing, supports, tolerances, and draped fabric, unless noted otherwise on Drawings.
- 2. Placement:
  - a. Place reinforcement as shown on Drawings.
  - b. Accurately position in accordance with shop drawings; support and tie intersections in accordance with best practices and as necessary to secure reinforcement and prevent



- displacement by formwork, construction, or concrete placement operations.
- c. Locate and support reinforcing by metal chairs or mortar blocks as required; wood or foam supports are not acceptable.
- d. Reinforcing bars may be relocated as necessary to avoid interference with other reinforcement, conduit, or other embedded items.
- e. If any reinforcing bar is moved a distance exceeding one bar diameter of the specified placing tolerance, the resulting rearrangement of the reinforcement shall be subject to acceptance by the Structural Engineer.
- f. Reinforcement to maintain minimum concrete coverage as shown.
- 3. Fastening:
  - a. Securely tie bars and bar supports together with 16 gauge wire to hold reinforcement accurately in position during concrete placement.
  - b. Set wire so that ends are directed into the concrete.
  - c. Wire tie stirrups and ties to main reinforcement.
- 4. Supports:
  - a. General: Provide sufficient number of supports and of strength to carry the reinforcement. Do not place reinforcing bars more than 2 inches beyond last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.
  - b. On ground: Use concrete block.
  - c. Over Formwork: In unexposed areas use concrete block or metal chairs. In exposed slabs and similar conditions use approved "invisible" metal chairs, hot-dip galvanized or approved plastic type.
- C. SPACING OF BARS
  - 1. Space reinforcing bars to comply with ACI 318 unless otherwise noted on Drawings. In conformance with placement requirements specified above, reinforcing bars may be relocated as necessary to avoid interference with other reinforcement, conduit, or other embedded items.
- D. SPLICES IN REINFORCEMENT
  - 1. CRSI standard by lapping ends, placing bars in contact, and tightly wire tying or by welding in an approved manner, except as noted otherwise.
  - 2. Splice in a manner developing at least 125% of the yielding strength of the bar.
- E. SHRINKAGE & TEMPERATURE REINFORCEMENT
  - 1. Conform to ACI 315 for reinforcement for shrinkage and temperature stresses normal to principal reinforcement where same is placed in one direction only.
- F. PLACING WELDED WIRE FABRIC
  - 1. Install in all concrete slabs on grade, except slabs where bar reinforcing is indicated; provide sizes specified herein or otherwise indicated, and with minimum coverages indicated for concrete protection.
  - 2. Install welded wire fabric in as long lengths as practicable.
  - 3. Lap adjoining pieces at least 12" or one full mesh spacing plus 2", whichever is greater, and lace splices with 16 gauge wire. Offset end laps in adjacent widths to prevent continuous laps in either direction.
  - 4. Do not carry through expansion joints.
- G. FIBROUS SECONDARY REINFORCEMENT
  - 1. For all standard weight slabs on grade add fibrous reinforcing to concrete mix at the batch plant, at manufacturer's recommended rate per cubic yard of standard weight and lightweight concrete mixes, and in strict accordance with fiber manufacturer's printed instructions.

END OF SECTION 032000

## SECTION 033000 - CAST-IN-PLACE CONCRETE

### PART 1 - GENERAL

- 1.1 DESCRIPTION
  - A. WORK INCLUDED: Drawings and general provisions of the Contract Documents including General, Supplementary and other Conditions and Division 1, "General Requirements" Sections, apply to the work specified in this Section.
  - B. RELATED WORK
    - 1. Section 031000: Concrete formwork.
    - 2. Section 032000: Concrete reinforcement.
    - 3. Section 033450: Concrete finishing.
  - C. COORDINATION
    - 1. Coordinate all installation under this Section with work of other trades.
- 1.2 QUALITY ASSURANCE
  - A. GENERAL
    - 1. Concrete shall conform to all provisions of the latest edition of the (ASTM) American Society for Testing and Materials and the (ACI) American Concrete Institute noted within this specification, except as modified by the Supplemental Requirements contained herein.
    - 2. Use adequate numbers 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. STANDARD SPECIFICATIONS
    - 1. Conform to ACI 302 "Guide for Concrete Floor and Slab Construction".
    - 2. Conform to ACI 304 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete".
    - 3. Conform to ACI 306R "Recommended Practice for Cold Weather Concreting"; conform to ACI 305R "Recommended Practice for Hot Weather Concreting".
    - 4. Conform to ACI 308 "Standard Practice for Curing Concrete".
    - 5. Conform to ACI 318 "Building Code Requirements for Reinforced Concrete".
  - C. QUALITY CONTROL
    - 1. Do not commence placement of concrete until mix designs have been reviewed and approved by the Owners Representative and all governmental agencies having jurisdiction, and until copies are at the job site, and the batch plant.
- 1.3 SUBMITTALS
  - A. SUBMIT
    - 1. Submit list of all items proposed to be provided under this Section together with manufacturer's product data and installation instructions for all such proprietary materials.
    - 2. Submit product data and manufacturer's instructions for all required products.
  - B. Provide the following submittals in accordance with ACI-301:
    - 1. Admixture certification. Chloride ion content must be included.
    - 2. Aggregate certification.
    - 3. Concrete mix design. Submit a mix design for each strength and type of concrete. Clearly indicate where each mix design will be used.
    - 4. Construction and control joints not shown on drawings.
    - 5. Materials and methods for curing (per Section 033450).
    - 6. Laboratory tests on concrete.
- 1.4 JOB CONDITIONS
  - A. WINTER CONCRETING
    - 1. Provide adequate equipment for heating materials and protecting concrete during freezing or near-freezing weather.
    - 2. Keep all materials, reinforcement, forms, and ground in contact with concrete, free from frost; use no materials containing ice.

- B. HOT WEATHER CONCRETING
  - 1. Take steps to reduce concrete temperature and water evaporation by proper attention to ingredients, production methods, handling, placing, protecting and curing.
- C. LOADING STRUCTURES
  - 1. Protect all in-place structures from excessive loading. Shore and brace as necessary to prevent all damage.

## PART 2 - PRODUCTS

### 2.1 FORM MATERIALS

- A. Provide in accordance with Section 031000 for all work of this Section.

### 2.2 CONCRETE MATERIALS PORTLAND CEMENT

- A. 1. Provide a standard brand of Portland cement complying with ASTM C150, Type II, low

alkali. Do not change the brand of cement during progress of the Work except as approved in writing by the Owners Representative.

### D. AGGREGATE

- 1. General
  - a. Provide hardrock aggregate complying with ASTM C33, with additional attributes specified herein.
  - b. For making grading tests of fine and coarse aggregate, use square mesh wire cloth complying with ASTM E11.
- 2. Fine aggregate
  - a. Provide washed natural sand having strong, hard, durable particles, and containing not more than 2% by weight of deleterious matter such as clay lumps, mica, shale, or schist.
  - b. Grade from coarse to fine within the following limits:

Sieve

Percentage by weight passing sieve:

size:	Minimum:	Maximum:
3/8"	100	---
No. 4	95	100
No. 8	65	95
No. 16	45	75
No. 30	30	50
No. 50	10	22
No. 100	2	8

- 3. Coarse aggregate
  - a. Provide coarse aggregate consisting of clean, hard, fine grained, sound crushed rock or washed gravel, or a combination of both, containing not more than 5% by weight of flat, chip-like, thin, elongated, friable, or laminated pieces, nor more than 2% by weight of shale or cherty material. Any piece having a length in excess of five times the average thickness shall be considered flat or elongated.
  - b. Use coarse aggregate of the largest practicable size for each condition of placement, subject to the following maximum size limitations: Do not exceed 3/4 of the clear distance between reinforcing bars 1/5 of the narrowest dimension between sides of forms, or 1/3 the depth of any slab section.
  - c. Grade combined aggregates within the following limits:

Sieve size                      Percentage by weight passing sieve:

or size in inches	1-1/2" aggregate:		1" aggregate:		3/4" aggregate:	
	Min:	Max:	Min:	Max:	Min:	Max:
1-1/2"	95	---	---	---	---	---
1"	75	90	90	100	---	---
3/4"	55	77	70	90	90	100
3/8"	40	55	45	65	60	80
No. 4	30	45	31	47	40	60
No. 8	22	35	23	40	30	45
No. 16	16	30	17	35	20	35
No. 30	10	20	10	23	13	23
No. 50	2	8	2	10	5	15
No. 100	0	3	0	3	0	5

#### E. WATER

1. Use only water which is clean and free from deleterious amounts of acid, alkali, salt, and organic materials.

#### 2.3 ADMIXTURES

- A. Use only standard brands of admixtures for concrete, approved by the Owners Representative, meeting or exceeding the following requirements.
  1. Air entraining admixtures shall conform to "Specifications for air-entraining admixtures for Concrete" ASTM C-260.
  2. Water Reducing Admixture: "Eucon WR-75" by The Euclid Chemical Co., "Pozzolith 200N" by Master Builders, "Plastocrete 161" by Sika Corporation, and WRDA-64 by W.R. Grace. The admixture shall conform to ASTM C-494, Type A and not contain more chloride ions than are present in municipal drinking water.
  3. Water Reducing, Retarding Admixture: "Eucon Retarder-75" by The Euclid Chemical Co., "Pozzolith 100XR" by Master Builders, DARATARD-17 by W.R. Grace, or "Plastocrete 161MR" by Sika Corporation. The admixture shall conform to ASTM C-494, Type D and not contain more chloride ions than are present in municipal drinking water.
  4. Mid-Range Water Reducing Admixture: "Daracem-55" as manufactured by W.R. Grace, Sikament HP" as manufactured by Sika Corporation, or approved equal. The admixture shall not contain calcium chloride, and shall conform to ASTM C-494, Type A.

#### 2.4 ACCESSORY MATERIALS

- A. Expansion joint filler: Provide preformed strips, non-extruding and resilient bituminous type, of thickness indicated, complying with ASTM D1751, ("Fibre Expansion Joint" by W.R. Meadows or approved equal).
- B. Bonding Materials: The compound shall be a polyvinyl acetate, rewettable type, "Euco Weld" by The Euclid Chemical Company or "Weld-crete" by The Larsen Company. Use only in areas not subject to moisture.
- C. Bonding Admixture: The compound shall be a latex, non-wettable type, "SBR Latex" or "Flex- Con" by The Euclid Chemical Company, or "Daraweld C" by W.R. Grace.
- D. Structural Bonding Epoxy Adhesive: The compound shall meet ASTM C-881 and shall be a two (2) component, 100% solids, 100% reactive compound suitable for use on dry or damp surfaces, "Euco Epoxy #452 MV or #620" by The Euclid Chemical Company, "Sikadur Hi-Mod or Sikadur 32 Hi-Mod LPL" by Sika Chemical Corporation.
- E. Epoxy Joint Filler: Shall be a multi component, 100% solids compound with a minimum shore D hardness of 50, "Euco Epoxy #700" by The Euclid Chemical Company or "Sikadur 51 NS/SL" by Sika Chemical Corporation. When and where this is specifically noted to be used, this shall be applied as late as possible after the concrete floor slab is poured, preferably at least 6 months, but not earlier than 2 months after the concrete floor slab is poured. Use in all interior slab joint locations, where concrete slab is to be left exposed.
- F. Joint Sealant: Shall be "Eucolastic 1SL" by The Euclid Chemical Company, or "SikaFlex Ia" by Sika Corporation. The sealant shall be a one part urethane sealant requiring no primer and

conforming to ASTM C-920, Type S, grade NS., class 25. Use in exterior slab joint locations, where specifically noted.

- G. Concrete Fibers: Concrete fibers for all designated areas shall be 100% virgin polypropylene material. Fibers shall be 1/2" or 3/4" in length such as Grace "Microfiber" by W.R. Grace, "Fibermesh" by Fibermesh Co., or approved equal. Fibers shall be used at a minimum dosage rate of 1-1/2 lbs. per cubic yard, unless otherwise specified. Grace "Microfiber" shall be used at a rate of 1 lb. per cubic yard.

## 2.5 EQUIPMENT FOR MIXING & PLACING

### A. CONVEYING EQUIPMENT

1. Use crane bucket, wheelbarrow, pumps, or buggies to deliver concrete to placing location.
2. Chuting permitted only by methods to insure a practically continuous flow of concrete at delivery and to prevent material separation.
3. If pumping is employed, secure prior approval of equipment, procedures and mix design. No aluminum pipes or chutes will be permitted for pumping, chuting or tremie operations.

### B. COMPACTION EQUIPMENT

1. Use internal mechanical vibrators with 7000 rpm minimum frequency.

## 2.6 CONCRETE MIXES

- A. Proportions for concrete mixes shall be in accordance with ACI 301. All mixes must be approved by the Owners Representative prior to use on the job. No deviations from the approved mixes will be permitted without written prior approval of the Owners Representative.
- B. Where the concrete production facility can establish the uniformity of its production for concrete of similar strength and materials based on recent test data, the average strength used as a basis for determining mix design proportions shall exceed the specified design strength by the requirements of ACI-318 or ACI-301.
- C. When a concrete production facility does not have field test records for calculation of standard deviation, the required average strength shall be at least 1200 psi greater than the specified design strength.
- D. All concrete shall contain the specified water-reducing or water-reducing retarding admixture and/or mid-range or high-range water-reducing admixture (superplasticizer). All concrete slabs, placed at air temperatures below 40° F shall contain the specified non- corrosive non-chloride accelerator. All concrete required to be air entrained shall contain an approved air-entraining admixture. All pumped concrete, concrete for industrial slabs, architectural concrete, concrete required to be watertight, and concrete with a water- cement ratio below 0.50 shall contain the specified high-range water-reducing admixture (superplasticizer). All concrete slabs and flatwork, both interior and exterior, shall contain the specified concrete fibers.
- E. All concrete containing the high-range water-reducing admixture (superplasticizer) shall have a maximum slump of 8" unless otherwise approved by the Owners Representative. The concrete shall arrive at the job site at a 3" max. slump, be verified, then the high-range water-reducing admixture added to increase the slump to the approved level. All other concrete shall have a maximum slump of 3" for slabs and 4" for other members. This maximum slump may not be exceeded except by the job-site addition of the specified high-range water-reducing admixture, (Superplasticizer). In those portions of the structures where member dimensions and/or congestion due to reinforcing steel prevent the proper placement and consolidation of the concrete at the maximum slump specified, superplasticizer shall be used by the Contractor in lieu of increasing the slump of non-superplasticized concrete by the addition of water.
- F. Hardrock concrete
  1. Achieve a weight of approximately 145 pcf and an ultimate compressive strength as listed in the following table.

#### Concrete Types

<u>Location</u>	<u>Req'd 28 day Compressive Strength</u>	<u>Maximum Water Cement Ratio</u>	<u>Air Content</u>
Footings, and all other below grade	3000	0.50	Optional
	3500	0.50	2% ± 1%

Interior slabs on grade,  
and interior walls

Concrete subjected to freezing and thawing and exterior slabs subjected to deicers

4000

0.45

6% ± 1%

- G. Do not retemper mix by adding water in field.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

##### A. SURFACE CONDITIONS

1. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

##### B. CLEANING FORMS

1. Before placing concrete, clean spaces within forms of all refuse, debris and dirt. Provide cleaning holes for removal of foreign matter; after cleaning, replace forms at openings and brace to prevent form failure.

##### C. MIXING & PLACING

1. Conform to the requirements of ACI 301.
2. Clean free of all foreign matter and ice, all mixing and transporting equipment, subgrade and forms to receive concrete.
3. Clean reinforcement of deleterious coatings and ice.

#### 3.2 CONCRETE MIXING

##### A. Concrete consistency

1. Use the amount of water established by the approved mix design.
  - a. Do not exceed the maximum quantity specified for the grade of concrete.
  - b. Use the minimum amount of water necessary to produce concrete of the workability required by the Owners Representative.
  - c. Do not supplement the predetermined amount of water with additional water for any reason.
2. Measure concrete consistency by ASTM C143 method.
3. Provide maximum slumps of concrete as follows:
  - a. Footings and slabs on soil: 3", (+1", -1").
  - b. Other concrete: 4".

#### 3.3 INSERTS, ANCHORS, AND EMBEDDED ITEMS

##### A. Concrete fasteners

1. In addition to their use where the pins are loaded in shear, powder driven concrete fasteners may be used in tension for support of light loads such as acoustical ceilings, duct work, conduits, pipes, and similar items when such loads are limited to less than 75 lbs.
2. Where "Red Head", "Hilti", or similar types of concrete anchor bolts are used for significant gravity loads or seismic anchorage, test in the presence of the approved testing agency:
  - a. Proof test 50% of the bolts (alternate bolts in any group arrangement) to twice the allowable load.
  - b. If there are any failures, also test the immediately adjacent bolt.
3. Where hanger rods, bolts, wire, or similar items are used to suspend construction items, place in the concrete as required and/or indicated.

##### B. Reglets, Reveals, and Rebates

1. Form reglets, reveals and rebates as required to receive frames, flashing, and

- other equipment, and as shown on the Drawings.
  - 2. Verify the dimensions and positions of required reglets, reveals, and rebates with the
- C. Embedded Piping, and Rough Hardware
  - 1. Coordinate the various trades who are required to fasten work to the structure, or are required to insert therein any sleeve, box, bolt, anchor, insert, or other rough hardware.
  - 2. Provide every facility for setting all required items accurately in the forms.
  - 3. Be responsible for changes in position of such items after they have been set.
  - 4. Provide in the forms for all sleeves, boxes, bolts, anchors, inserts, strap anchors, for frames, and other rough hardware required for the Work, and which are shown or required to be embedded in the concrete.
  - 5. Conduits and sleeves
    - a. Locate so as not to reduce the strength of construction. Do not place pipes or conduits in slabs.
- 3.4 CONVEYING AND PLACING CONCRETE
  - A. Before placing concrete, thoroughly clean forms, wash out with water, and make tight.
  - B. Time of placing
    - 1. Do not place concrete until reinforcement, conduits, outlet boxes, anchors, sleeves, hangers, bolts, and other embedded materials are securely and properly fastened in their correct positions.
  - C. Preparation
    - 1. Before new concrete is deposited upon or against concrete that has taken its initial set or has hardened, remove all incrustations from forms and reinforcement.
    - 2. Remove all laitance, oil, and loose particles from concrete and concrete surfaces, and thoroughly clean the forms with water under stiff pressure.
    - 3. Remove all laitance after concrete has hardened partially (not less than two hours nor more than four hours after placing) by brushing with stiff bristles, or by directing a stream of water from a 1/4" nozzle, or by other methods approved by the Owners Representative, to expose the clean top surface of the coarse aggregate.
    - 4. Where cleaning is not satisfactory to the Owners Representative, sandblast the surface and then wash again.
  - D. Method of placing
    - 1. Place concrete only under the degree of inspection described elsewhere in these Specifications, and as required by governmental agencies having jurisdiction.
    - 2. Do not place concrete outside of regular working hours unless required inspection authorities have been notified properly and are present.
    - 3. Spouts, pipes, troughs, belts, chain buckets, and other equipment may be used in conveying concrete, but the manner and method used shall be only as approved by the Owners Representative.
    - 4. Do not permit concrete to free drop more than 4'-0".
    - 5. Deposit concrete direct into conveyances, and direct from conveyances to final points of repose, except where troughs, buckets, or the like are used, in which case dump concrete into hoppers and then into the conveyances.
    - 6. Where tremies are used, or where the free drop is 4'-0" or more, and through reinforcement, use a dumping box or board, moving the concrete from there by shovels or hoes.
    - 7. Deposit concrete so that the surface is kept level throughout, a minimum being permitted to flow from one position to another, and place as rapidly as practicable after mixing.
    - 8. Do not use in this Work any concrete not placed within 30 minutes after leaving the mixer.
- 3.5 STEPS, SLABS, WALK, AND PAVING ON EARTH
  - A. Preparation for slabs on earth
    - 1. Prepare the subgrade and base as specified in other Sections.
    - 2. Dampen the subgrade for exterior slabs and paving if necessary prior to placing concrete.
  - B. Placing and finishing
    - 1. Mechanically vibrate and then tamp the freshly placed concrete, using a heavy tamper,

- until at least 3/8" of mortar is brought to the surface.
- 2. Use tampers having a face consisting essentially of a grid of parallel metal bars.
- 3. Tamp with a light tamper, and screed with heavy straightedge, until depressions and irregularities are worked out and the surfaces are true to finish grades and elevations.
- 4. Remove excess water and debris worked to the surface in compaction and screeding.
- 5. Remove laitance as described previously.
- 6. When concrete has hardened sufficiently, float to a compact and smooth surface.
- C. In Slabs-On-Grade Provide
  - 1. Contraction (control) joints in interior work.
    - a. By use of tooled control joints or at Contractor's option by sawcutting to 1/5 slab depth.
    - b. Where not otherwise shown on Drawings, provide control joints at column centerlines and/or at the following maximum spacing:
      - 4" slab max. spacing = 10 ft. each way.
      - 5" slab max. spacing = 10 ft. each way.
      - 6" slab max. spacing = 12 ft. each way.
      - 7" slab max. spacing = 14 ft. each way.
      - 8" slab max. spacing = 14 ft. each way.
  - 2. Joints in Exterior Work
    - a. Provide contraction joints in exterior work where shown by means of 1" deep tooled joints with edges rounded and tool marks removed. If the layout of the contraction joints is not shown on the plans, then the Contractor shall submit a proposed layout to the Owners Representative for approval with joints at a maximum of 5'-0" o.c.
  - 3. At all construction joints of slabs on grade, discontinue slab reinforcement, and provide smooth, greased dowels.
  - 4. Provide isolation joints where shown at contacts between slabs and vertical surfaces. Form with 15# felt paper for interior work and expansion joint filler for exterior work.
  - 5. Seal exterior expansion and contraction joints where shown with the here-in specified joint sealing compound.
  - 6. Provide the finish surfaces shown on the Drawings or otherwise directed by the Owners Representative, in accordance with pertinent provisions of Section 033450 of these Specifications.
- D. Cure and protect concrete in accordance with pertinent provisions of Section 033450 of these Specifications, and ACI 302.

### 3.6 INSPECTIONS & TESTING

- A. Standard slump and cylinder samples (3) must be taken after addition of water. The method of measuring water and the person(s) authorized to add water and make samples must be mutually responsible for cost of additional sampling and testing costs related to discharging concrete in conflict with Contract Documents. All concrete requiring a slump change of more than 2", except when the HRWR admixture is being used, will be rejected.
- B. Slump and compressive strength tests: ASTM C 39 - one set for each 50 cu. yd. or fraction thereof, of each class of concrete placed in any one day or for each 5000 sq. ft. of surface area placed: one specimen tested at 7 days, one specimen tested at 28 days and one specimen retained in reserve at the laboratory for later testing if required.
- C. Determine air content of normal-weight concrete for each strength test. In addition, for all exterior flat-work concrete, determine air content per ASTM C 231-82 for each 20 cu. yd. placed.
- D. When concrete fails to meet the acceptance criteria specified in ACI-301, Section 17.2, the Owners Representative may order further testing of concrete in place in accordance with Section 17.3. When such tests are ordered, cost of testing shall be paid by the Contractor.
- E. The Contractor shall bear all cost of correcting rejected work, including the cost of the Owners Representative's additional services thereby made necessary.

END OF SECTION 033000



## SECTION 033450 - CONCRETE FINISHING

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Work included: Drawings and general provisions of the Contract Documents including General, Supplementary and other Conditions and Division 01, "General Requirements" Sections, apply to the work specified in this Section.
- B. Related work:
  - 1. Section 033000: Cast-in-place concrete.

#### 1.2 QUALITY ASSURANCE

- A. Use adequate numbers 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. STANDARD SPECIFICATIONS
  - 1. Refer to Section 033000 for same and conform thereto as they apply to concrete curing and finishing work of this Section.
- C. DEFECTIVE WORK
  - 1. Contractor shall remove and replace at his own expense all defective work as adjudged by the Owners Representative.

#### 1.3 SUBMITTALS

- A. Submit:
  - 1. Submit manufacturer's product data and installation instructions for proprietary materials including curing agents, sealers, hardeners, and the like.

#### 1.4 JOB CONDITIONS

- A. Refer to Section 033000 for same and conform thereto as they apply to concrete curing and finishing work of this Section.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Concrete materials: Comply with pertinent provisions of Section 033000, except as may be modified herein.
- B. Curing Compound for Curing Exterior Slabs:
  - 1. Furnish liquid membrane-forming curing compound conforming to ASTM C309, Type I clear. Compound shall be a clear styrene acrylate type, 30% solids content minimum, and have test data from an independent testing laboratory indicating a maximum loss of 0.030 grams per sq. cm. when applied at a coverage rate of 300 sq. ft. per gallon.
  - 2. Compound shall be "Super Rez Seal" by The Euclid Chemical Co., "Vulkem 2101" by Mameco International, Inc., "Masterkure 30" by Master Builders, or "Sealtight CS-309" by W. R. Meadows.
  - 3. Manufacturer's Certification required. (Sodium Silicate Compounds are prohibited.)
- C. Curing and Sealing Compounds Interior Slabs
  - 1. For Interior Slabs to be Left Exposed and Sealed: Furnish liquid membrane-forming acrylic polymer, water-based curing and sealing compound conforming to ASTM C1315, Type I, Class A, non-yellowing; W. R. Meadows "VOCOMP-25" or equivalent, compatible with sealer specified below.

### PART 3 - EXECUTION

#### 3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

#### 3.2 FINISHING OF FORMED SURFACES – REPAIR OF SURFACE DEFECTS

- A. General:

1. After removal of forms, give the concrete surfaces one or more of the finishes specified below where so indicated on the Drawings, or directed by the Owners Representative.
- B. Formed Surfaces to be Concealed in the Finished Work:
  1. Leave surfaces with the texture imparted by forms, except patch tie holes and defects.
  2. Remove fins exceeding 1/4" in height.
- C. Formed Surfaces to be Left Exposed in the Finished Work: All exposed concrete not otherwise specified and excluding wall surfaces in mechanical rooms and the like, shall be treated as follows:

### 3.3 FINISHING SLABS

- A. Finishing Slabs – General
  1. All floor surfaces shall be within  $\pm 1/2"$  of finished floor elevations designated on plans. If variations greater than this exist, the Owners Representative may direct the Contractor to grind the surfaces to bring them within the requirements. Patching of low spots shall not be permitted. Grinding shall be done as soon as possible, preferably within 3 days, but not until the concrete is sufficiently strong to prevent dislodging coarse aggregate particles.
  2. Slab Curling: Acknowledging that there will be a strong possibility of having at least some slab curling at slab edges, the Contractor shall take reasonable means to keep this curling to a minimum. In the event that curling occurs to an extent and at locations which will be detrimental to the service and Owners Representative quality standards needed for the final slab finish, the Contractor shall, at his expense, provide edge grinding or other means as necessary to bring the slab curling to a finish surface acceptable to the Owners Representative.
- B. Slab Finishes
  1. Unless otherwise shown, scheduled or specified hereinafter, use the following finishes, as applicable:
    - a. Furnish smooth, hard-troweled finish for all interior floors to remain as walking
    - b. Furnish smooth troweled finish for all exterior equipment pads, dumpster pads, and the like.
    - c. Furnish broomed trowel finish for all exterior walks, ramps, stairs and miscellaneous slab surfaces not otherwise specified to receive smooth trowel or exposed aggregate finishes.
    - d. Furnish "tactile" diamond pattern finish, in addition to broom finish, at handicap ramp cut slab areas indicated to receive "tactile warning surface".
    - e. Furnish "non-slip" finish for cast-in-place curbs and associated gutters, as applicable, integral with sidewalks.
  2. Before finishing work begins, place, strike off, consolidate and level and/or slope, as applicable, concrete to condition ready for finishing.
  3. Consolidate placed concrete preferably with power driven floats of impact type except for thin joist slabs; use wood or cork-faced hand floats for surfaces inaccessible to power floats.
  4. Replace slabs with excessive shrinkage cracks and those not properly sloped and finished to floor flatness and leveling tolerances specified above, as approved, without additional cost to Owner.
- C. Float Finish:
  1. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further until ready for floating.
  2. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
  3. During or after the first floating, check the planeness of the surface with a ten foot straightedge applied at not less than two different angles.
  4. Cut down high spots and fill low spots.
  5. Refloat the slab immediately to a uniform sandy texture.
- D. Troweled Finish:
  1. Provide a floated finish as described above, followed by a power troweling and then a hand troweling.
    - a. Produce an initial surface which is relatively free from defects, but which still may show some trowel marks.
    - b. Provide hand troweling when a ringing sound is produced as the trowel is moved over

- the surface.
  - c. Thoroughly consolidate the surface by hand troweling.
  - 2. Provide a finished surface essentially free from trowel marks, uniform in texture and appearance.
  - 3. On surfaces intended to support floor coverings, use grinding or other means as necessary and remove all defects of such magnitude as would show through the floor covering.
  - E. Broomed Trowel Finish:
    - 1. Power float to trueness within the specified tolerance, and provide one-pass steel troweling. After troweling, draw a broom across surface to a light transverse scored texture, as approved.
  - F. "Tactile" Finish:
    - 1. After floating and applying broom finish, imprint surface of handicap curb cuts with a diamond pattern texture using an expanded metal grate imprinting tool, as approved.
  - G. Non-Slip Finish:
    - 1. After troweling, obtain finish by dragging a strip of clean, wet burlap across the slab and curb surfaces to produce a fine, granular, or sandy textured surface without disfiguring marks.
    - 2. Round edges and joints in curbs with an edger having a radius of  $\frac{1}{4}$ ".
  - H. Exterior Control Joint & Slab Edge Treatment:
    - 1. Steel tool all control joints, all exposed perimeter edges, and edges of expansion joints, prior to filling with sealant, to a smooth bullnose form, using an edger having a radius of  $\frac{1}{4}$ ", as approved.
    - 2. Form control joints in uniform straight lines, spaced no greater than 5 feet apart. Coordinate exact locations and alignment with Owners Representative.
- 3.4 CURING AND PROTECTION
- A. The Contractor shall use all necessary precautions to keep cracking of all concrete work to an absolute minimum. Beginning immediately after placement, protect concrete from premature drying, excessively hot and cold temperatures, and mechanical injury.
    - 1. Maintain curing procedures used for seven (7) days at minimum temperature of 50° F; if mean daily temperature drops below 40° F during this period, extend curing period an equal number of days or provide temporary heat or additional protection to maintain specified minimum temperature of air in contact with concrete.
  - B. Temperature, wind, and humidity;
    - 1. When concrete slab placements are subjected to high temperatures, wind and/or low humidity the Owners Representative may require the use of the specified evaporation retarder to minimize plastic cracking. The compound may be required to be applied one or more times during the finishing operation. The initial application is usually made after the strike- off operation.
    - 2. Cold weather:
      - a. When the mean daily temperature outdoors is less than 40°F, maintain the temperature of the concrete between 50°F and 70°F for the required curing period.
      - b. When necessary, provide a proper and adequate heating system capable of maintaining the required heat without injury due to concentration of heat.
      - c. Do not use combustion heaters during the first 24 hours unless precautions are taken to prevent exposure of the concrete to exhaust gases which contain carbon dioxide.
      - d. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
      - e. Only the specified non-corrosive non-chloride accelerator shall be used. Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted.
    - 3. Hot weather:
      - a. When necessary, provide wind breaks, fog spraying, shading, sprinkling, ponding, or wet covering with a light colored material, applying as quickly as concrete hardening and finishing operations will allow.
    - 4. Rate of temperature change:
      - a. Keep the temperature of the air immediately adjacent to the concrete during and

immediately following the curing period as uniform as possible and not exceeding a change of 5° F in any one hour period, or 50° F in any 24 hour period.

C. Curing Walls & Formed Surfaces:

1. Where forms are exposed to the sun, minimize moisture loss by keeping the forms wet until they can be removed safely.
2. In hot weather, immediately after forms have been removed, cure by continuous sprinkling or covering with absorptive mat or fabric kept continuously wet or use vapor mist bath.
3. In freezing weather, protect in accordance with ACI 301.

D. Curing Exterior Slabs:

1. Spray slabs with liquid membrane-forming compound specified above for exterior slabs, applied at not less than the manufacturer's specified and recommended rate.

E. Curing and Sealing Interior Slabs:

1. For Slabs to be Left Exposed and Sealed:
  - a. Spray new slab surfaces with liquid membrane-forming curing and sealing compound specified above, applied at not less than the manufacturer's specified and recommended rate and in accordance with manufacturer's written instructions.
  - b. Apply a minimum of two coats at right angles, strictly in accordance with the sealer manufacturer's written application instructions and recommendations, for a uniform, low gloss sheen finish.
  - c. In addition, all floor slabs shall be covered with blankets for a minimum of 72 hours after pouring.
  - d. After curing compound has fully dried per manufacturer's recommendations, Contractor shall cover such slab surfaces with protective sheeting as necessary to avoid damage due to subsequent construction work and prior to final finishing of such floor surfaces as specified below.

END OF SECTION 033450

## SECTION 040650 – MASONRY MORTAR & GROUT

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

##### A. GENERAL REQUIREMENTS

1. Drawings and general provisions of the Contract Documents including General, Supplementary and other Conditions and Division 1, "General Requirements" Sections, apply to the work specified in this Section.

##### B. RELATED WORK IN OTHER SECTIONS

1. Unit masonry work covered under Section 042200.

#### 1.2 QUALITY ASSURANCE

##### A. INSPECTIONS & TESTS

1. Field testing of grout and pre-construction and construction-site testing of mortar.
2. Contractor shall furnish mortar and grout materials for testing; follow Owners Representative's directions for any required jobsite alterations to mortar and grout mixes.

#### 1.3 SUBMITTALS

##### A. MATERIAL, MIX CERTIFICATES

1. If mortar and grout are plant-mixed, furnish certificate from supplier attesting to compliance with specified requirements.

##### B. SAMPLES

1. Provide samples of mortar as part of sample panels specified to be provided under Section 042200.

#### 1.4 PRODUCT DELIVERY, STORAGE & HANDLING

##### A. JOBSITE MATERIAL STORAGE

1. Store under roof, off ground; protect from elements.

#### 1.5 JOB CONDITIONS

##### COLD WEATHER WORK

1. If temperature of outside air is below 40 degrees F., heat water and/or aggregates to produce mortar temperature between 40 and 100 degrees F. Maintain control of mortar material temperatures to avoid flash set by use of trial mixes, as approved.

## 2.1 MATERIALS

## 2.1 MATERIALS

### A. GENERAL

## 1 Confor

1. Conform to ASTM C270 for unit masonry mortar, ASTM C476 for grout.

B. PORTLAND CEMENT

1. ASTM C150, Type II; gray color for all work.

C. LIME

1. Hydrated lime ASTM C207, Type S.

#### D. MORTAR AGGREGATE

- MORTAR AGGREGATE**
1. Furnish ASTM C144 clean, sharp, well-graded aggregate free from injurious amounts of dust, lumps of shale, alkali, surface coatings, and organic matter.

### E. GROUT AGGREGATE

- GROUT AGGREGATE**
1. For fine grout, furnish fine aggregate meeting grading requirements of ASTM C404 Table I, size 1, 3/8-inch maximum.

## F. WATER

1. Clean, potable, fresh.

G. MORTAR COLOR

- MORTAR COLOR
1. As directed

## H. ADMIXTURES

- ### ADMIXTURES
1. Anti-Freeze Compounds: Liquid, salts, or other substances to lower the freezing point in mortar NOT permitted.

## 2.2 MORTAR TYPES FOR UNIT MASONRY WORK

## A. GENERAL

- GENERAL
1. All mortar compressive strengths and types listed hereinafter for various uses shall be those conforming to and referenced in ASTM C270 for all masonry.
  2. Measure materials for mortar in method that specified or designed proportions can be controlled and accurately maintained.

## B. COMPRESSIVE STRENGTHS

1. Mortar Type Average Compressive ASTM C270 Strength at 28 Days psi Type M 2500  
psi

C. MORTAR PROPORTIONS (PARTS) BY VOLUME (C270)

- MORTAR PROPORTIONS (PARTS) BY VOLUME (C270)**
1. Mortar Type M:
- |  |   |  |
|--|---|--|
| Portland cement                                    | : | 1  |
| Hydrated lime or lime putty                        | : | 1/4  |
| Aggregate, damp, loose,<br>passing a 16 mesh sieve | : | 2-1/4 to 3 times sum of cement and lime volumes. |
2. Mortar Design: Exact proportions of mortar mixes specified herein to be determined by an approved independent laboratory using ingredients proposed to be furnished on the work and following procedures set forth for pre-construction evaluation of mortar mixes.

## 2.3 GROUT TYPES FOR REINFORCED MASONRY WORK

A.

## GENERAL

1. Grout compressive strengths and types listed hereinafter for various uses shall be those conforming to and referenced in ASTM C476.
2. Design to attain (1) minimum compressive strength of 2500 psi in 28 days, average of three 3-1/2 x 3-1/2 x 7 inch cubes, (2) water retention (flow after suction, min., percent of original flow) of 70, and (3) air content (volume, max. percent) of 18.
3. Measure materials for grout in method that specified or designed proportions can be controlled and accurately maintained.

B. GROUT PROPORTIONS (PARTS) BY VOLUME (C476)

- |  |   |  |
|--|---|--|
| 1. Fine Aggregate Grout: Portland cement | : | 1  |
| Hydrated lime or lime putt               | : | 0 to 1/10  |
| Fine aggregate, damp, loose              | : | 2-1/4 to 3 times sum of cement and lime volumes. |

## 2.4 MORTAR & GROUT MIXING

### A. MACHINE MIXING

1. Mix mortar for a minimum period of three minutes, mix grout for five minutes minimum; mix in as approved mechanical batch mixer.

### B. HAND MIXING

1. For small batches of setting mortar and grout only, then only upon approval of Owners Representative.

### C. MORTAR WORKABILITY & CONSISTENCY

1. Maintain mortar on the board sufficiently plastic to produce easy working with trowel, use water only in minimum quantity for workability.
2. Discard mortar mixed in excess of two hours before placing.
3. Do not re-temper mortar at the mixer.

### D. GROUT CONSISTENCY

1. Maintain 5-8 inch slump for grout used for units with low absorption and up to 10-inch slump for high absorption units.
2. Do not add water unless given specific approval by special inspector at the jobsite.

## PART 3 - EXECUTION

### 1.1 APPLICATION

#### A. MORTAR TYPES & USES

1. Use Type M mortar for all masonry work.

#### B. GROUT TYPES & USES

1. Use fine grout for grouting voids of concrete masonry unit block work.

### 1.2 FIELD QUALITY CONTROL

#### A. INSPECTIONS & TESTS

1. Field inspection and testing shall be performed. Contractor shall comply with the requirements of the Owner's testing and inspection agency.
  - a. General: Independent laboratory to test exact proportions of mortar mixes using the same aggregate and other materials furnished by Contractor proposed to be used on the work; material samplings shall comply with ASTM C780, Article 9, "Sampling".
  - b. Pre-construction evaluation of mortars:
    - i. Provide pre-construction evaluation of mortars in compliance with ASTM C780 using test methods and procedures specified therein in Annexes A1 through A7, inclusive.
    - ii. Under test method Annex A6, test mortar mixes for compliance with specified compressive strengths.
    - iii. Should test specimens fail to meet specified compressive strengths, immediately notify Owners Representative and Contractor.
  - c. Construction-site evaluation of mortars:
    - i. Take three 2 x 4 inch cylinder specimens for each 30 cu. yd. of mortar or fraction thereof being placed each day.
  - d. Test mortar specimens for compliance with specified compressive strengths as indicated on Structural Drawings.
  - e. Should test specimens fail to meet specified compressive strengths, immediately notify Owners Representative and Contractor; perform further testing of construction-site mortar when so directed by Owners Representative.

END OF SECTION 040650

## SECTION 042200 - CONCRETE UNIT MASONRY

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Drawings and general provisions of the Contract Documents including General, Supplementary and other Conditions and Division 01, "General Requirements" Sections, apply to the work specified in this Section.
- B. Related Work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, and Sections in Division I of these specifications.
  - 2. Reinforcing steel for dowels for tying masonry work to foundation wall construction specified under Section 032000.
  - 3. Mortar and grout covered under Section 040650.

#### 1.2 QUALITY ASSURANCE

- A. Use adequate numbers 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. Inspections and Tests
  - 1. Inspections: Will include, but not necessarily be limited to, the following:
    - a. Check reinforcing steel in place.
    - b. Inspect all cells and clean-outs.
    - c. Inspect grouting operation.
- d. Refer to Structural Notes for additional inspection requirements.
- 2. Testing: Will include, but not necessarily be limited to, the following:
  - a. Test materials for compliance with specifications.
  - b. A set of masonry prisms shall be built and tested in accordance with IBC Section 2105 prior to the start of construction. Materials used for the construction of the prisms shall be taken from those specified to be used in the Project. Prisms shall be constructed under the observation of the engineer or special inspector or an approved agency and tested by an approved agency.
  - c. A set of three (3) prisms shall be built and tested during construction in accordance with IBC Section 2105 for each 5,000 square feet of wall area, but not less than one (1) set of three (3) prisms for the Project.

#### 1.3 SUBMITTALS

- A. Certificates
  - 1. For masonry work furnish for approval, attesting conformance to specified ASTM Designation and Type for each different type masonry unit.
- B. Manufacturer's Data
  - 1. Furnish product information for masonry products. Include manufacturer's specifications including installation instructions and general recommendations for the type of products required.
- C. Samples
  - 1. Sample Units: Where products proposed to be furnished are different than products specified, furnish one (1) sample board of each such unit type, of colors and textures required, for approval. Product samples not required where furnishing specified product.

#### 1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials dry; store all materials at site off ground, adequately covered to protect from moisture and other damage until placed in the work.
- B. Contractor shall allow for and discard all chipped or broken masonry.

#### 1.5 JOB CONDITIONS

- A. Protection of Work, Weather and Work Suspensions
  - 1. Wet Weather: General Contractor shall provide and maintain approved protective cover over exposed masonry work during placing and after placement, until such construction is



- sealed. Contractor shall cover top of all masonry work with minimum 10 mil visqueen sheeting, properly secured, to protect the work from filling up with rain water or other precipitation until the final capping of such work occurs.
2. Cold Weather: When temperature is or expected to be below 40° F during and for 48 hours after placing, heat materials and provide adequate enclosures to maintain temperature above 40° F; obtain approval of protection methods prior to proceeding. Protect all masonry from calcium chloride in mortar for any masonry work. See IBC Section 2104 for additional cold weather construction requirements.
  3. Hot Weather: Protect masonry construction from direct exposure to wind and sun when erected in ambient air temperature of 90° F in the shade, with relative humidity less than 50%.
- B. Cooperation with Other Trades
1. Obtain exact sizes of openings for ducts and pipes specified in other Sections; properly build around same. Build in and coordinate with and for work furnished by other trades as required; ductwork man-way restraints and their anchors, bolts, inserts, shelf angles, and other items as shown.
  2. Coordination with Water Repellent Work: All coordination necessary with water repellent coating applicator as required to ensure all such application work is fully accomplished in a timely and proper manner, is the sole responsibility of the General Contractor. As a part of such coordination, General Contractor shall provide all new masonry construction with complete and proper protection from precipitation as specified above, both during and following masonry wall construction, until the sealing process is complete.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Concrete Masonry Block & Veneer Units
1. Provide lightweight hollow load-bearing concrete masonry units complying with ASTM C-90, moisture controlled units texture, shape and color as directed and approved by the Owners Representative. Standard grey units may be used where they are totally concealed from view. See Architectural drawings for layup pattern and mortar joint locations.
    - a. The maximum moisture content of masonry block units shall be as follows:

Linear Shrinkage, %	Moisture Content, Max, % of Total Absorption (Average of 3 Units)
0.03 or less	35
From 0.03 to 0.045	30
0.045 to 0.065 max	25
  2. Dimensions:
    - a. Provide units of the dimensions shown on the Drawings.
    - b. Where dimensions are not shown on the Drawings, provide units having nominal face dimensions of 16" long by 8" high by the depth shown or otherwise required.
  3. Provide accessory shapes as indicated or otherwise required.
- B. Bars for Vertical & Horizontal Reinforcing
1. Furnish vertical and horizontal reinforcing of ATM A615, Grade 60. All reinforcing bars which are to be welded shall conform to ASTM A706. Use bars of sizes and quantities shown and noted shown and noted on Structural Drawings and related Details.
  2. Furnishing and placement of dowels associated with masonry work, to be set into concrete structures as indicated on Structural Drawings and specified therefore under Section 032000, shall be the responsibility of masonry subcontractor for work of this Section.
  3. Vertical bars to be of lengths and laps as required for low-lift grout work in lifts not exceeding five feet; length of bar laps as shown on Drawings.
  4. Furnish additional reinforcing as specified under Structural Notes or as otherwise indicated on Structural Drawings.
  5. Bending of bars per ACI 318.

- 6. Wire reinforcement per ASTM A82.
- E. Cleaning Solution
  - 1. Furnish ProSoCo Inc. "600 Detergent" masonry cleaner, or approved.

### PART 3 - EXECUTION

#### 3.1 INSPECTION OF PRIOR WORK

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Inspect bearing surfaces and related work in place for existing conditions.
- C. See that dowels, masonry anchors, shelf angles and weld plates, as applicable, are properly placed.
- D. Check that hollow metal door frames are secured in place, and are ready to receive grout as specified herein.
- E. If deficiencies or errors are found, notify those trades responsible that corrections are made as approved before starting work.

#### 3.2 PREPARATION

- A. Preparation for New Masonry Installation
  - 1. Clean top surfaces of existing bearing surfaces and work in place removing all foreign material before starting or resuming work.
  - 2. Wet masonry units only as required to assure watertight mortar joint bond.

#### 3.3 MASONRY INSTALLATION

- A. Workmanship, General
  - 1. Except as otherwise noted or indicated, lay all work to true plumb and level lines, maintaining established approved module, coursing patterns and uniform joints for each type of work shown. Use story pole for vertical coursing dimensions.
  - 2. Use stock units wherever possible; where cutting required use high speed masonry power saw. Masonry units utilized on an exposed finish surface shall be free of chips, breakage, or other imperfections.
  - 3. Unless otherwise noted, lay all masonry work in a full bed of mortar, head and vertical joints completely filled. Use mortar and grout types specified herein and under Section 040650 for the work and as described hereinafter.
  - 4. Install reinforcing, ties, and anchors for work of other trades as work proceeds.
  - 5. Provide complete coordination of installation of mechanical plumbing, electrical conduit, and the like.
  - 6. Unless otherwise specified hereinafter, omit filling joints with mortar in joints of the following types: Expansion, control and seismic.
  - 7. Cut and remove split face to a smooth finish as required at surfaces abutting door and window framing, as applicable; elsewhere where shown.
- B. Concrete Masonry Block Unit Installation
  - 1. General
    - a. Lay units by face shell bedding method, in running bond with full head joints conforming to IBC Section 2104, of masonry type, face pattern, and size courses as directed by the Owners Representative for the various wall structures.
    - b. Install units with all open cells placed vertically.
    - c. Lay continuous bond beam courses in locations indicated.
    - d. Make all joints approximately 3/8" width.
    - e. Anchor units to wall and foundation structures as shown.
    - f. Cap tops of exterior screen walls as directed by the Owners Representative.
    - g. Clean the top surface of foundation free from dirt, debris, and laitance, and expose the aggregate prior to start of installing first course.
    - h. Accurately fit the units to plumbing ducts, openings, and other interfaces, neatly patching all holes.

- i. Keep the walls continually clean, preventing grout and mortar stains. If grout does run over, clean immediately.
    - j. Do not use chipped or broken units. If such units are discovered in the finished wall, the Owners Representative may require their immediate removal and replacement with new units at no additional cost to the Owner. Refacing of masonry units will be allowed only after written permission is given by the Owners Representative.
  - 2. Built-in Work
    - a. As the work progresses, build in built-in items specified under this and other sections of these specifications. Fill in solidly with masonry around built-in items, except at expansion/control joints.
    - b. Install reglets, control joints, veneer ties and reinforcement as work proceeds, as applicable, installed as shown for the various conditions and/or otherwise specified herein.
    - c. As the work proceeds, fill hollow metal frames solid with grout. Leave space between hollow metal frames and exterior masonry for subsequent application of sealant.
  - 3. Finishing Mortar Joints
    - a. Tool all joints with steel tool to a concave profile, as approved whether exposed or concealed.
  - D. INSTALLATION OF MASONRY REINFORCING
    - 1. Install deformed reinforcing steel bars vertically and horizontally in cells of concrete masonry unit work, including bond beams, sized and spaced as shown, prior to grouting. Engage vertical reinforcing with "vertical bar positioners" and with bar dowels installed under work of Section 032000.
    - 2. Install all other reinforcing as specified in Structural Notes or otherwise indicated on Drawings and related details.
  - E. LOW LIFT GROUT WORK
    - 1. Install grout specified in Section 040650 in low lifts not exceeding 5 feet, completely filling all voids of CMU. Grout around vertical reinforcing, anchors, weld plates, etc.; at all bond beams install grout around horizontal reinforcing, completely filling bond beam voids. Install grout in cells of masonry units which are to receive wall mounted items and anchored with expansion type anchor bolts. All grout shall be vibrated and re-vibrated.
  - 3.4 POINTING & CLEANING
    - A. Pointing – New Work
      - 1. On completion of new work, point all exposed masonry work surfaces filling all holes and cracks. Remove all loose mortar and defective work and re-point as approved.
    - B. Cleaning
      - 1. Clean all surfaces of concrete masonry unit surfaces which are to be left exposed. Clean surfaces with cleaning solution specified above.
      - 2. Wet surfaces with water before applying cleaning solution; after application of cleaning solution, water rinse all solution off the surface.
      - 3. Protect adjacent materials from damage from cleaning solution.
      - 4. Leave all surfaces clean, free from mortar and all stains, ready for respective water repellent and paint coatings, as applicable.
- END OF SECTION 042200

SECTION 04 05 23  
MASONRY ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Masonry accessories including the following:
  - 1. Open mesh to collect and suspend mortar droppings in commercial masonry cavity walls, with insect barrier. (MortarNet with Insect Barrier is recommended)
  - 2. Weep holes for masonry walls. (WeepVent) (CellVent)
  - 3. Flashing system for single-wythe concrete masonry walls designed with no visible drip edge. (BlockFlash)
  - 4. Flashing system for single-wythe concrete masonry walls designed with a visible stainless steel drip edge. (BlockNet)

1.2 RELATED SECTIONS

- A. Section 04 05 00 - Common Work Results for Masonry.
- B. Section 04 20 00 - Unit Masonry.
- C. Section 07 19 13 - Acrylic Water Repellents.
- D. Section 07 25 00 - WeatherBarriers.
- E. Section 07 60 00 - Flashing and Sheet Metal.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum 2 years experience with similar masonry installations.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Protect products from exposure to direct sunlight.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Mortar Net Solutions®, which is located at: 6575 Daniel Burnham Dr. Suite G; Portage, IN 46368; Toll Free Tel: 800-664-6638; Fax: 219-787-5088; Email:[request info \(abrooks@mortarnet.com\)](mailto:abrooks@mortarnet.com); Web:<http://www.mortarnet.com>
- B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 MATERIALS

- A. Open mesh to collect and suspend mortar droppings in commercial masonry cavity walls: MortarNet with Insect Barrier as manufactured by Mortar Net Solutions.
  - 1. Description: 90 percent open weave mesh in trapezoidal configuration connected by continuous bottom strip 3 inches high. The insect barrier fabric is attached to one face of the trapezoidal MortarNet material.
  - 2. Size: MortarNet with Insect Barrier 0.4 inches thick by 10 inches high, partial recycled nylon material. Materials shall touch both the outer wythe and the inner wall of masonry cavity.
  - 3. Size: MortarNet with Insect Barrier 1 inch thick by 10 inches high, partial recycled nylon material.

4. Size: MortarNet with Insect Barrier 2 inches thick by 10 inches high, partial recycled polyester material.
- B. Weep Vents for Masonry Walls: WeepVent as manufactured by Mortar Net Solutions.
1. Description: 90 percent open weave mesh, UV-resistant recycled polyester; rectangular shape.
  2. Standard Size: 1/2 inches thick by 3-1/2 inches high by 2-5/8 inches long.
  3. Color: Match mortar color with selection from manufacturer's standard colors.
  4. Color: Gray.
- C. Flashing system for single-wythe concrete masonry walls with no visible drip edge: BlockFlash as manufactured by Mortar Net Solutions, high-density polypropylene composition molded into a flashing pan with 5/16 inch high perimeter flanges, integral weep spout and insect guard.
1. BlockFlash 8 Inch; 5-5/8 inches long, 6 3/4 inches wide.
- D. Flashing system for single-wythe concrete masonry walls with visible stainless steel drip edge: BlockNet flashing system as manufactured by Mortar Net Solutions.
1. Drainage Strip: 28 gauge stainless steel, 3 3/8 inches wide by 72 inches long (66 inches net usable) with formed drip on the face edge and drainage mesh factory attached.
  2. Vertical drainage mesh: 7 inch wide by 7 inch long by 1/8 inch thick polyester mesh.
  3. Diamond-Mesh Lath: 3.4 lb/sq. yd., self-furring, diamond-mesh lath complying with ASTM C 847, with 1/4 inch (6.4 mm) high loft non-woven attached drainage mesh. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G60 (Z180).
- E. Flashing and drainage system for masonry cavity walls. Available in 5 1/2 foot (5 feet net) factory-assembled panels that include flashing membrane, drip edge, drainage mesh, weep tabs and termination bar, or in 50 foot-long rolls with drainage mesh and weep tabs attached to the membrane. (drip edge, termination bar supplied separately for rolls). TotalFlash as manufactured by Mortar Net Solutions System consists of the following components:
1. Flashing Membrane Materials and Sizes:
    - a. Material: 45 mil elastomeric ethylene propylene diene monomer (EPDM).
  2. Mortar Collection Mesh and Weep Tabs: Drainage/Weep System; 1/4 inch thick, 10 inches high, 60 inches long. Woven mortar collection mesh and integrated mesh weep tabs designed to allow moisture to migrate to the exterior of the building; mesh factory-adhered to the flashing membrane.
  3. Drip Edge: 3 inch width, 5 feet long with 3/8 inch hemmed, formed drip edge designed to allow moisture to pass from the wall.
    - a. Material: 28 gauge (0.014 inches) Type 304 stainless steel.
  4. Sealant: BTL-1 butyl sealant (single component, moisture cure), for lapping TotalFlash Sections, as approved by manufacturer. May be used with EPDM and TPO. Not for use in expansion, control or general construction joints.
  5. Termination Bar: Designed to fasten top of flashing membrane to substrate; manufactured from high-strength corrosion-resistant PVC, UV-stabilized, 5 feet long, pre-drilled holes 6 inches on-center for attachment.
  6. Termination Bar: Designed to fasten top of flashing membrane to substrate. Manufactured from corrosion-resistant stainless steel 1-1/4 inches wide x 16 gauge, 100% recyclable, 5 feet long, pre-drilled holes 6 inches on center for attachment.
  7. Termination Bar: Designed to fasten top of flashing membrane to substrate. Manufactured from corrosion-resistant stainless steel 1-1/4 inches wide x 16 gauge thick, 1/4 inch lip, pre-drilled holes 6 inches on-center for attachment.
  8. Screws: Self-tapping hex head screws with watertight neoprene self-sealing washer, #14 by 2 inches. Works with concrete, concrete block, wood and steel studs.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify owner's agent and Owners Representative of unsatisfactory preparation before proceeding.

## 3.2

## 3.3 INSTALLATION

- A. Open mesh to collect and suspend mortar droppings in commercial masonry cavity walls: MortarNet with Insect Barrier as manufactured by Mortar Net Solutions. Install in strict accordance with manufacturer's instructions and as follows:
1. Verify installation of flashing and completion of first two courses of masonry.
  2. Extend flashing from the bottom of the MortarNet to at least 6 inches above the top of the MortarNet to prevent mortar bridging between the outer wythe and inner wall.
  3. Remove mortar droppings and debris from flashing and weep vents.
  4. Install one continuous row of MortarNet at base of wall in cavity and over all wall openings directly on flashing, with dovetail profile facing upward. For wall cavities that exceed 11 feet in height, place an additional continuous trapezoidal strip on wall reinforcing anchors/ties at every 9 feet to 11 feet of wall height.
  5. Butt ends together. Compress slightly if necessary.
  6. Face Insect Barrier toward the outside of the building.
- B. Open mesh to collect and suspend mortar droppings in residential masonry cavity walls: HouseNet with Insect Barrier as manufactured by Mortar Net Solutions. Install in strict accordance with manufacturer's instructions and as follows:
1. Extend flashing from the bottom of the HouseNet to at least 6 inches above the top of the HouseNet to prevent mortar bridging between the outer wythe and inner wall.
  2. Verify installation of flashing and completion of first two courses of masonry.
  3. Remove mortar droppings and debris from flashing and weep vents.
  4. Install one continuous row of HouseNet at base of wall in cavity and over all wall openings directly on flashing, with dovetail profile facing upward. For wall cavities that exceed 9 feet in height, place an additional continuous trapezoidal strip on wall reinforcing anchors and ties at every 9 feet of wall height.
  5. Butt ends together. Compress slightly if necessary.
  6. Place insect barrier to the outside of the building.
- C. Weep vents for masonry walls: WeepVent as manufactured by Mortar Net Solutions: Install in strict accordance with manufacturer's instructions and as follows:
1. Place WeepVent in open head joints at the flashing level.
  2. Insert a WeepVent at a maximum of 24 inches on center in open head joints.
  3. Clean flashing and weep holes free of mortar droppings and debris.
  4. Align exterior face of WeepVent with exterior plane of mortar.
- D. Weep vents for masonry walls: CellVent as manufactured by Mortar Net Solutions. Install in strict accordance with manufacturer's instructions and as follows:
1. Place CellVent in an open head joint at the flashing level.
  2. Insert a CellVent at a maximum of 24 inches on center in open head joints.
  3. Clean flashing and weep vents free of mortar droppings and debris.
  4. Align exterior face of insert with exterior plane of mortar.
- E. Flashing system for single-wythe concrete masonry walls designed without a visible drip edge: BlockFlash as manufactured by Mortar Net Solutions. Install in strict accordance with manufacturer's instructions and as follows:
1. Install on top of foundation or on top of first concrete masonry unit course closest to foundation, not less than 4 inches above finish grade but below interior floor. Also applicable over wall openings, bond beams, structural steel members and in parapet walls.
  2. Install with weep spouts flush with the face of the foundation or concrete masonry unit course. Use the reference lip on the bottom of the weep spout to properly position the pan on the foundation or concrete masonry units.
  3. Install with standard mortar spreading techniques with mortar lapped, first over the inner and second over the outer flanges of the BlockFlash units.
  4. Install included 7 inch by 16 inch mesh elements in concrete masonry unit core cavity immediately above each BlockFlash location with the mesh aligned against the outside and inside faces of the block

- and with each mesh element touching the BlockFlash pan below it to prevent clogging from mortar and grout droppings.
  - 5. At grouted vertical cells, remove radius bridge piece at the edge of the grouted cell and cross web mortar to prevent grout spill on to the BlockFlash pan.
  - 6. Remove obstructions from weep spouts, but do not remove the factory-installed insect guards.
- F. Flashing system for single-wythe concrete masonry walls designed with a visible, continuous stainless steel drip edge: BlockNet as manufactured by Mortar Net Solutions. Install in strict accordance with manufacturer's instructions and as follows:
- 1. Install mesh-side up, with drip edge in alignment with edge of foundation or first concrete masonry unit course closest to foundation, but below interior floor. Applicable over wall openings, bond beams, structural steel members and in parapet walls.
  - 2. Apply commercial sealant to unmeshed end section of strip under the BlockNet and on the masonry surface parallel with the face of the wall, align and butt edges of adjacent strip.
  - 3. Form continuous drainage strip drainage system along entire perimeter of wall.
  - 4. At concrete masonry unit (CMU) course directly above the BlockNet, install one 7 inch by 7 inch vertical mesh sleeve in each core. Install against inside face of outside shell to form U-shape sleeve, with the mesh touching the BlockNet drainage strip below.
- G. Continuous drainage plane: WallNet as manufactured by Mortar Net Solutions. Install in strict accordance with manufacturer's instructions.
- 1. Install drainage plane after windows and doors are installed. Begin at the base of the wall and unroll and fasten using staples (minimum 1/2 inch) wrap cap screws or nails at a spacing of 1 anchor per 3 sq. ft. of wall area. Install in a shingle pattern, stagger vertical seams.
  - 2. Install weep vents.
- H. Continuous drainage plane: A continuous drainage plane between the structural wall and exterior veneers such as adhered masonry, sidings, and other forms of absorptive cladding as well as most types of rainscreen systems, DriPlane as manufactured by Mortar Net Solutions.
- 1. Install drainage plane after windows and doors are installed. Begin at the base of the wall and unroll and fasten using staples (minimum 1/2 inch) wrap cap screws or nails at a spacing of 1 anchor per 3 sq. ft. of wall area. Install in a shingle pattern, stagger vertical seams.
  - 2. Install weep vents.
- I. Flashing and drainage system for masonry cavity walls: TotalFlash as manufactured by Mortar Net Solutions. Install in strict accordance with manufacturer's instructions.
- 1. Install in proper relationship to adjacent construction.
  - 2. Install using adhesive applied horizontally at termination bar and drip edge, and vertically at ends of panels.
  - 3. Apply sealant to the top of termination bars in a continuous bead.
  - 4. Rigid insulation may be installed over or behind TotalFlash.
- J. One-Piece preformed 14 Inch High Corner Boots and End Dams: CompleteFlash as manufactured by Mortar Net Solutions. Install in strict accordance with manufacturer's instructions.

### 3.4 PROTECTION

- A. Protect installed products from damage until completion of project.
- B. Repair or replace damaged products before covering with construction.

SECTION 04 22 23  
ARCHITECTURAL CONCRETE UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Split face concrete masonry units.

1.2 RELATED SECTIONS

- A. Section 04 27 23 - Cavity Wall Unit Masonry.
- B. Section 07 21 13 - Board Insulation.
- C. Section 07 60 00 - Flashing and Sheet Metal.

1.3 REFERENCES

- A. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
- B. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
- C. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units
- D. ASTM C1262 - Standard Test Method for Evaluating the Freeze-Thaw Durability of Dry-Cast Segmental Retaining Wall Units and Related Concrete Units
- E. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry.

1.4 DEFINITIONS

- A. CMU: Concrete Masonry Unit.

1.5 INFORMATIONAL SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
  - B. Product Data: Manufacturer's product information and data sheets for each product specified in this section, including:
    - 1. Substrate preparation instructions and recommendations.
    - 2. Installation means and methods.
    - 3. Recommendations and requirements for proper storage and handling.
  - C. Warranty Information:
    - 1. Submit confirmation and details of manufacturer's warranty, extended warranty, and replacement policies.
  - D. Submit sample boards, cards or charts depicting available textures and colors for each CMU.
- 1.6 CLOSEOUT SUBMITTALS
- A. Spare Materials: Provide spare Concrete Masonry Units of each color and finish combination used on the project.
    - 1. 12 spare units for each color and finish combination.
    - 2. Provide spare materials as noted in the schedule related to work in this section.
- 1.7 DELIVERY, STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements: Deliver CMUs and other cementitious materials neatly stacked and packaged on pallets. Store pallets in single stacks on level ground and protect from weather.
- B. Deliver mortar materials in original unbroken, undamaged packages with labels intact and visible.
- C. Store materials covered and off the ground until used on the Work in this section.

1.8 WARRANTY

- A. Provide the manufacturer's standard form in which the specified manufacturer agrees to replace products that fail to meet the ASTM Standards within the specified warranty period.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design Manufacturer: [Echelon, An Oldcastle Company](#).
  - 1. Address: [400 Perimeter Center Terrace, Atlanta, GA 30046](#).
  - 2. Phone: (770) 804 3363.
  - 3. Website: [www.echelonmasonry.com](http://www.echelonmasonry.com).
- B. Substitution Limitations:
  - 1. Submit substitution requests in accordance with provisions of Section 01 60 00.
  - 2. Single manufacturer will provide, from a single source, the following components:

2.2 PERFORMANCE REQUIREMENTS

- A. Freeze-Thaw Resistance: Meet or exceed the requirements of ASTM C1262.
- B. Abrasion Resistance: Meet or exceed the requirements of ASTM C744.
- C. Adhesion: Meet or exceed the requirements of ASTM C744.



- D. Color Change: Meet or exceed the requirements of ASTM C744.
- E. Resistance to Crazing: Meet or exceed the requirements of ASTM C744.
- F. Fire Resistance: Rated up to (4) four hours.
- G. Integral Water Repellant: Concrete Masonry Units must include an integral water repellant (IWR) admixture at the time of production.

## 2.3 CONCRETE MASONRY UNITS

- A. General / Appearance: Integrally colored pre-finished architectural concrete block meeting the requirements of ASTM C90, with a rough-hewn texture on one or more faces. Molded as two units attached face to face, the units are split after curing to expose a rough texture and reveals the aggregates used in the block.
  - 1. Basis of Design Product: Split-Face masonry units, from Echelon.
  - 2. Water Repellant: Include a water repellant admixture at the time of production.
  - 3. .

## 2.4 FINISHES

- A. Color:
  - 1. As selected from manufacturers standard color range.
  - 2. Color: Ash (43) Mundelein Verify with Facility Director
- B. Provide site-mixed mortar that meets or exceeds the requirements of ASTM C270 Type N.
- C. Provide site-mixed mortar that meets or exceeds the requirements of ASTM C270 Type S.
- D. Mortar must include manufacturer approved compatible integral water repellent (IWR) additive added to each batch in the dosage rates for mortar type specified.

## 2.5 MIXES

- A. Portland Cement: Conforming to ASTM C150 Type I, Type II or Type III as required to achieve optimal results based on ambient project conditions.
- B. Hydrated Lime: Conforming to ASTM C207, Type S.
- C. Aggregates: Conforming to ASTM C144 for mortar and ASTM C404 for grout.
- D. Pigments: Conforming to ASTM C979. Comply with quantity limitations in referenced standards and from the pigment manufacturer.
- E. Admixtures: Comply with quantity limitation specified ASTM C1384 "Standard Specification for Admixtures for Masonry Mortars" when adding to mortar.
  - 1. Cold Weather: Comply with ASTM C494 "Standard Specification for Chemical Admixtures for Concrete."
  - 2. Integral Water Repellant: Liquid polymeric, admixture that does not reduce flexural bond strength
    - a. Basis of Design Product: RainBloc® Water Integral Repellent Masonry Unit admixture, manufactured by ACM Chemistries, Inc.
- F. Water: Potable; Clean and drinkable.

## 2.6 ACCESSORIES

- A. Provide coordinating accessory stones as necessary to achieve a complete installation as noted in the Contract Drawings.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that site conditions are properly prepared to receive concrete masonry units.
- B. Verify that bearing elements are within tolerances conforming to the requirements of ACI 117.
- C. Verify that locations of penetrations, projections and built-in items are correct and properly prepared for work specified in this section.
- D. Verify concrete brick masonry units are according to project specification and meet appropriate ASTM specification requirements. Commencement of installation constitutes acceptance of Concrete Face Brick, Concrete Masonry Units, Concrete Masonry Veneers, and Concrete Thin Veneers.
- E. Preparation: Prepare surfaces and materials in accordance with MSJC Specifications for Masonry Structures. If preparation is the responsibility of another installer, notify Owners Representative in writing of deviations from manufacturer's recommended installation tolerances and conditions.
- F. Provide adequate lighting for masonry work by placing all lighting at a reasonable distance from the wall for even illumination.

### 3.2 PREPARATION

- A. Proceed with installation only after substrate(s) are been properly prepared and within tolerances recommended by the manufacturer.
- B. Commencement of installation constitutes acceptance of site conditions.
- C. Draw blocks from more than one pallet at a time during installation.
- D. Refer to NCMA TEK Notes, for hot and cold weather construction practices.

### 3.3 INSTALLATION

- A. Cutting: Make all unit cuts, including those for bonding, holes, boxes, etc., with motor-driven masonry saws, using either an abrasive or diamond blade. Cut neatly and locate for best appearance.
- B. Concrete Masonry Units:
  - 1. Install concrete masonry units in accordance with industry accepted masonry practices and manufacturer's instructions.
  - 2. Bond Pattern: As indicated on Construction Drawings.
  - 3. Do not use masonry units with broken corners and edges in excess of ASTM C90 and ASTM C1634.
  - 4. Supporting and Forms: Construct forms as needed to adequately and safely support installed concrete masonry units until mortar has cured.
- C. Mortar Bedding and Jointing:
  - 1. Lay units with full mortar coverage on head and bed joints taking care not to block cores to be grouted or filled with masonry insulation.
  - 2. Tool all joints into a concave configuration when mortar is thumbprint hard.
  - 3. Remove mortar from the face of masonry units before it sets.
  - 4. Tuckpoint joints of scored units for proper appearance and to prevent water penetration. Raked joints are not permitted and will be considered defective work.
- D. Flashing: Install flashing at locations shown in the plans and in strict accordance with Construction Drawings, manufacturer's instructions and accepted best practices for masonry flashing.
- E. Weeps and Vents: Galvanized steel, plastic tubes, corrugated plastic cell vents or spun polymer drain mesh vents. Install weeps or vents at proper intervals at courses above grade and at any water stops over windows, doors and beams. Consult NCMA TEK notes for proper flashing and drawings.

### 3.4 FLASHING

- A. All flashing and accessory detailing components must be corrosion resistant.
- B. Verify that all flashing, including adjacent roof flashing, has been properly installed. Extend flashing material above horizontal terminations, roofing material, drainage planes or drainage products.
- C. Integrate all flashing materials with moisture resistive barriers to prevent water penetration into structure. Lap water resistive barriers over weep screed flanges in a water shedding fashion.
- D. Control Joints: Designer to determine if and where control joints are needed and identify locations. Consideration should be given to where differential movement is expected or where movement may be concentrated. Refer to NCMA TEK 10-02C for guidance on control joint locations.

### 3.5 INSPECTION AND CLEANING

- A. Faces must conform to the requirements of ASTM C90 when viewed from twenty (20) feet at right angles to the wall with normal lighting.
- B. Keep work surfaces clean during installation. Use brushes, rags and burlap to remove excess mortar lumps and smears prior to hardening on the finished surfaces.
- C. Refer to Manufacturers recommendations for cleaning instructions for installed veneers.

END OF SECTION

## SECTION 061000 - ROUGH CARPENTRY PART 1 - GENERAL

### 1.1 SUMMARY

- A. Provide wood, nails, bolts, screws, framing anchors and other rough hardware, and other items needed, and perform rough carpentry for the construction shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. 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.

### 1.2 QUALITY ASSURANCE

- A. Use adequate numbers 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 standards:
  - 1. In addition to complying with the pertinent codes and regulations of governmental agencies having jurisdiction, unless otherwise specifically directed or permitted by the Owners Representative, comply with:
    - a. "Product Use Manual" of the Western Wood Products Association for selection and use of products included in that manual;
    - b. "Plywood Specification and Grade Guide" of the American Plywood Association;
    - c. "Standard Specifications for Grades of California Redwood Lumber" of the Redwood Inspection Bureau for Redwood, when used.
    - d. "National Design Specifications for Wood Construction (NDS)" of the American Forest and Paper Association.

### 1.3 DELIVERY, STORAGE, AND HANDLING

- A. Protection:
  - 1. Deliver the materials to the job site and store, in a safe area, out of the way of traffic, and shored up off the ground surface.
  - 2. Identify framing lumber as to grades, and store each grade separately from other grades.
  - 3. Protect metals with adequate waterproof outer wrapping.
  - 4. Use extreme care in off loading of lumber to prevent damage, splitting, and breaking of materials.

## PART 2 - PRODUCTS

### 2.1 GRADE STAMPS

- A. Identify framing lumber by the grade stamp
- B. Identify plywood as to species, grade, and glue type by the stamp of the American Plywood Association.
- C. Identify other materials of this Section by the Appropriate stamp of the agency approved in advance by the Owners Representative.

### 2.2 MATERIALS

- A. Provide materials in the quantities needed for the Work shown on the Drawings, and meeting or exceeding the following standards of quality, unless otherwise noted on the drawings:
  - 1. Horizontal framing members: Douglas Fir-Larch, NDS Table 4A or 4D, No. 1 or better for members larger than 2x10; NDS Table 4A or 4D, No. 2 or better for 2x10 and smaller members.
  - 2. Vertical framing members: Douglas Fir-Larch, NDS Table 4A or 4D, No. 1, or better. Posts shall be Douglas Fir No. 1, or better.
  - 3. Plates shall be Douglas Fir-Larch, NDS 4A or 4D, No. 1, or better. Nailers, bridging,

- and blocking: Douglas Fir-Larch NDS Table 4A, No. 2, or better.
4. Moisture content of framing lumber shall not exceed 19% by weight at time of installation.
  5. Plywood: (PS-1 plywood bearing the APA trademark of the American Plywood Association.)
    - a. Sheathing: Plywood or Oriented-Strand-Board sheathing with exterior glue, grades and sizes as shown on the Drawings.
    - a. Backboard: 3/4" thick A/D, group 1, interior.
  6. Wood Preservative: Ammoniacal copper arsenite, or 5% solution of pentachlorophenol. All wood in contact with earth, with concrete slabs on grade, and with concrete or masonry foundations shall be pressure preservatively treated Douglas Fir, or foundation grade redwood. All hangars and connections shall be nailed for maximum capacity. All framing anchors, connections, nails, etc. that are attached to pressure treated wood shall have the proper protective finish as required for that pressure treated material.
  7. Rough hardware:
    - a. Steel items:
      - i. Comply with ASTM A7 or ASTM A36.
      - ii. Use galvanized at exterior locations.
    - b. Machine bolts: Comply with ASTM A307.
    - c. Lag bolts: Comply with Fed Spec FF-B-561.
    - d. Nails:
      - i. Use common of the gage and size noted in NDS Table No. L4.
      - ii. Comply with Fed Spec FF-N-1.
      - iii. Use galvanized at exterior locations.
    - e. Joist hangers: Simpson, Silver, or equal as approved by the Owners Representative, having ICBO approval.
    - f. All framing anchors, connections, nails, etc. that are attached to pressure treated wood shall have the proper protective finish as required for that pressure treated material.
  8. Microlams: Microlam members shall be minimum 1.9 E D.F. "MICRO=LAM" as manufactured by Trus Joist, or approved equal, having ICBO approval..

## PART 3 - EXECUTION

### 3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which all work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.2 DELIVERIES

- A. Stockpile materials sufficiently in advance of need to assure their availability in a timely manner for this Work.
- B. Make as many trips to the job site as are needed to deliver materials of this Section in a timely manner to ensure orderly progress of the Work.

### 3.3 COMPLIANCE

- A. Do not permit materials not complying with the provisions of this Section to be brought onto or to be stored at the job site.
- B. Promptly remove non-complying materials from the job site and replace with materials meeting the requirements of this Section.

### 3.4 WORKMANSHIP

- A. Produce joints which are tight, true, and well nailed, with members assembled in accordance with the Drawings and with pertinent codes and regulations.
- B. Selection of lumber pieces:
  1. Carefully select the members.
  2. Select individual pieces so that knots and obvious defects will not interfere with placing bolts or proper nailing, and will allow making of proper connections.

3. Cut out and discard defects which render a piece unable to serve its intended function.
  4. Lumber may be rejected by the Owners Representative, whether or not it has been installed, for excessive knots, splits, warp, twist, bow, crook, mildew, fungus, or mold, as well as for improper cutting and fitting.
- C. Do not shim any framing component.

### 3.5 GENERAL FRAMING

- A. General:
1. In addition to framing operations normal to the fabrication and erection indicated on the Drawings, install wood blocking and backing required for the work of other trades.
  2. Set horizontal and sloped members with crown up.
  3. Do not notch, cut, or bore members for pipes, ducts, or conduits, or for other reasons except as shown on the Drawings or as specifically approved in advance by the Owners Representative. Cutting or notching of wood studs per IBC 2308.9.10 and 2308.9.11 will not be allowed.
- B. Bearings:
1. Make bearings full unless otherwise indicated on the Drawings.
  2. Finish bearing surfaces on which structural members are to rest so as to give sure and even support.
  3. Where framing members slope, cut or notch the ends as required to give uniform bearing surface.

### 3.6 BLOCKING AND BRIDGING

- A. Install blocking as required to support items of finish and to cut off concealed draft openings, both vertical and horizontal, between ceiling and floor areas. Also provide blocking at all unsupported wall sheathing edges, at edges of all roof and wall openings, and as required for a complete and proper installation.
- B. Bridging:
1. Install wood cross bridging (not less than 2" X 3" nominal), metal cross bridging of equal strength, or solid blocking between joists where shown.
  2. Cross bridging may be omitted for roof and ceiling joists where the omission is permitted by code, except where otherwise indicated on the Drawings.
  3. Install solid blocking between joists at points of support, and where shown on the Drawings. Blocking may be omitted where joists are supported on metal hangers, unless shown otherwise on the Drawings.

### 3.7 ALIGNMENT

- A. On framing members to receive a finished surface, align the finish subsurface to vary not more than 1/8" from the plane of surfaces of adjacent furring and framing members.

### 3.8 INSTALLATION OF PLYWOOD SHEATHING

- A. Placement:
1. Place horizontal plywood with face grain perpendicular to supports and continuously over at least two supports, except where otherwise shown on the Drawings. Place vertical plywood with face grain parallel to supports with supports or blocking at all plywood edges.
  2. Center joints accurately over supports
- B. Protect plywood from moisture by use of waterproof coverings until the plywood in turn has been covered with the next succeeding component or finish.

### 3.9 FASTENING

- A. Nailing:
1. Use only common wire nails or spikes of the dimensions shown on the Drawings and the IBC Nailing Schedule, except where otherwise specifically noted. Use deformed shank nails on all plywood wall sheathing receiving plaster.

2. For conditions not covered in the Nailing Schedule provide penetration into the piece receiving the point of not less than 1/2 the length of the nail or spike, provided, however, that 16d nails may be used to connect two pieces of 2" (nominal) thickness.
  3. Nail without splitting wood.
  4. Prebore as required.
  5. Remove split members and replace with members complying with the specified requirements.
  6. Care shall be taken to ensure proper placing and nailing of all plywood for walls and roofs. Comply with the recommendations of the American Plywood Association, and as noted herein. Unless otherwise noted, provide 1/8" and 1/8" spacing for plywood sheathing at the end and edge joints respectively. Start nailing sheets of plywood at the end or side closest to the plywood sheet previously installed, and then progress with the nailing across the panel, from the initial side to the opposite side or end. Do not nail the four corners of the panel initially and then nail the field.
- B. Bolting:
1. Drill holes 1/16" larger in diameter than the bolts being used.
  2. Drill straight and true from one side only.
  3. Do not bear bolt heads on wood, but use washers under head and nut where both bear on wood, and use washers under all nuts.
- C. Screws:
1. For lag screws and wood screws, prebore holes same diameter as root of threads, enlarging holes to shank diameter for length of shank.

END OF SECTION 061000

## SECTION 061900 - WOOD TRUSSES

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Provide wood trusses where shown on the Drawings, as specified herein, and as needed for a complete and proper installation
- B. Related work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 01 of these Specifications.
  - 2. Section 061000: Rough Carpentry.

#### 1.2 SUBMITTALS

- A. Product data: Submit:
  - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements including loading, minimum member sizes, shapes, etc.;
  - 2. Shop Drawings showing species, sizes, and stress grades of lumber proposed to be used; pitch, span, camber, configuration, and spacing of trusses; connector type, thickness, size, location, and design value; and bearing details;
  - 3. Manufacturer's recommended installation procedures which, when approved by the Owners Representative, will become the basis for accepting or rejecting actual installation procedures used on the Work.
  - 4. Certification, signed by an officer of the fabricating firm, indicating that the trusses comply with the design and project requirements.
  - 5. The shop drawings are interpretations of and are supplemental to the design drawings and specifications. Their intent is to demonstrate to the Owners Representative that this Contractor has understood the design concept, and to provide the detailed information necessary for the fabrication, assembly and installation of the products or materials specified. Neither the shop drawings nor comments placed on them by the Owners Representative shall be construed as being change orders.

#### 1.3 QUALITY ASSURANCE

- A. Use adequate numbers 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.

### PART 2 - PRODUCTS

#### 2.1 WOOD TRUSSES

- A. Design:
  - 1. Provide the services of a civil or structural engineer registered to practice in the State of Michigan. This engineer shall design the wood trusses to sustain the indicated loads for the spans, profiles, and arrangements shown on the Drawings, and shall stamp and seal the truss shop drawings. Total load deflection shall be limited to no more than  $L/240$ . Live load deflection shall be limited to no more than  $L/360$ .
    - a. Comply with pertinent provisions of:
      - i. "Timber Construction Standards" of the American Institute of Timber Construction;
      - ii. "Quality Control Manual" of the Truss Plate Institute;
      - iii. The building code having jurisdiction.
  - 2. Fabrication:
    - a. Prefabricate in strict accordance with the Shop Drawings and other data approved by the Owners Representative.

#### 2.2 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Owners Representative.

### PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- B. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Owners Representative, anchoring all components firmly into position for long life under hard use.
  - 1. Hoist the trusses into position with proper bracing secured at designated lifting points.
  - 2. Exercise care to keep out-of-plane bending of trusses to a minimum.
  - 3. Install temporary horizontal and cross bracing to hold trusses plumb and in safe condition until permanent bracing is installed.
  - 4. Install permanent bracing and related components prior to application of loads to trusses.
  - 5. Tighten loose connectors.
  - 6. Restrict construction loads to prevent overstressing of truss members.
  - 7. Do not cut or remove truss members.

END OF SECTION 061900



## SECTION 074113 METAL ROOF, WALL, AND SOFFIT PANELS

### PART 4 GENERAL

#### 4.1 SECTION INCLUDES

- A. Metal Roof Panels:
  - 1. Standing seam roof system, 1-3/4 inch (44 mm) seam height. (SSL-175)
- B. Metal Wall Panels:
  - 1. Concealed fastener wall system. (Fidelity)
- C. Metal Wall and Soffit Panels:
  - 1. Flush wall and soffit system. (FP-100)
  - 2. Reveal flush wall and soffit system. (RP-100)
- D. Metal Soffit Panels:
  - 1. Reveal panel soffit system. (W-LOC)

#### 4.2 RELATED SECTIONS

- A. Section 05 10 00 - Structural Metal Framing.
- B. Section 05 40 00 - Cold-Formed Metal Framing.
- C. Section 07 21 19 - Foamed-In-Place Insulation.
- D. Section 07 27 00 - Air Barriers.
- E. Section 07 60 00 - Flashing and Sheet Metal.
- F. Section 07 90 00 - Joint Protection.
- G. Section 09 28 13 - Cementitious Backing Boards.
- H. Section 08 90 00 - Louvers and Vents

#### 4.3 REFERENCES

- A. Standing Seam Roof System, 1-3/4 Inch (44 mm) Seam Height: SSL-175 as manufactured by Everlast Metals.
  - 1. Compliance:
    - a. Uplift Resistance: UL 580 Class 90.
    - b. Structural Performance: ASTM E330. E72 and E1592.
    - c. Air Infiltration: ASTM E283.
    - d. Water Penetration: ASTM E331 and E1646.
    - e. Fire Rating: UL Class A Rated Assemblies, UL 263 and UL 790.
    - f. Hail Impact Rating: Class 4, UL 2218.
    - g. Florida Building Code: Approved.
    - h. Impact Resistance: PA 201.
    - i. Wind Driven Rain: TAS 100.
  - 2. Clips: Concealed.
  - 3. Profile: Pencil rib.
  - 4. Panel Width: 18 inches (447 mm).
  - 5. Seam Height: 1.75 inches (44 mm).
  - 6. Panel Length: As indicated on the Drawings.
  - 7. Minimum Slope: 2:12.

8. Striations: Not required.
9. Panel Surface: Smooth surface.
10. Base Metal: AISA G90 galvanized steel.
  - a. Minimum Yield: 33 to 45 KSI (227 to 310 MPa).
  - b. Thickness: 26 gauge (0.48 mm).
  - c. Thickness: 24 gauge (0.64 mm).
  - d. Thickness: As indicated on the Drawings.
  - e. Finish: G90 clear acrylic coated.
11. Base Metal, Thickness and Finish: As indicated on the Drawings.
12. Color: Gallery Blue (2621) Verify with Facility Director

#### 4.4 METAL WALL PANELS

##### A. Concealed Fastener Wall System: Fidelity Series as manufactured by Everlast Metals.

1. Compliance:
  - a. Air Infiltration: ASTM E283.
  - b. Water Penetration: ASTM E331.
2. Clips: Concealed.
3. Profile: FL-125.
4. FL Panel Width: 12 inches (305 mm).
5. Seam Height: 1-3/16 inch (30 mm).
6. Panel Length: As indicated on the Drawings.
7. Panel Surface: Smooth surface.
8. Base Metal: AISA G90 galvanized steel.
  - a. Minimum Yield: 33 to 45 KSI (227 to 310 MPa).
  - b. Thickness: 24 gauge (0.64 mm).
  - c. Finish: G90 clear acrylic coated.
9. Base Metal, Thickness and Finish: As indicated on the Drawings.
10. Color: Gallery Blue (2621) Verify with Facility

##### B. Flush Wall and Soffit System: FP-100 as manufactured by Everlast Metals.

1. Compliance:
  - a. Uplift Resistance: UL 580 Class 90.
  - b. Fire Rating: UL Class A Rated Assemblies, UL 263 and UL 790.
  - c. Hail Impact Rating: Class 4, UL 2218.
2. In-Seam Sealant: Not required.
3. Profile: Pencil rib.
4. Panel Width: 16 inches (406 mm).
5. Seam Height: 1 inch (25 mm).
6. Panel Length: As indicated on the Drawings.
7. Panel Surface: Smooth surface.
8. Venting: Required.
9. Clips: Concealed.
10. Base Metal: Aluminum.
  - a. Minimum Yield: 21 KSI (145 MPa).
  - b. Modulus of Elasticity: 10000 KSI (68.9 MPa).
  - c. Thickness: 0.032 inch (0.81 mm).
  - d. Thickness: 0.040 inch (1.02 mm).
  - e. Thickness: As indicated on the Drawings.
  - f. Finish: Anodized.
  - g. Finish: Fluropon.
  - h. Finish: Unpainted, mill finish.
  - i. Finish: As indicated on the Drawings.
11. Base Metal, Thickness and Finish: As indicated on the Drawings.

12. Color: Gallery Blue (2621) Verify with Facility

## PART 5 EXECUTION

### 6.1 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: Stable after testing at 240 deg F ; ASTM D 1970.
2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F ; ASTM D 1970.
3. Products: Subject to compliance with requirements, provide the following or equal:

- a. Grace Ice & Water Shield HT

### 6.2 MISCELLANEOUS MATERIALS

- 6.2.1 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 metal panels unless otherwise indicated.

- 6.2.1.1 Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.

- 6.2.1.2 Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

- 6.2.2 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, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

- 6.2.3 Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch-long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels.

- 6.2.4 Downspouts: Formed from same material as roof panels. 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 gutters.

- 6.2.5 Panel Fasteners: Self-tapping screws designed to withstand design loads.

- 6.2.6 Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

- 6.2.6.1 Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

- 6.2.6.2 Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

### 6.3 FABRICATION

- 6.3.1 General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- 6.3.2 Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- 6.3.3 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.
  - 6.3.3.1 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.
  - 6.3.3.2 Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat- lock seams. Tin edges to be seamed, form seams, and solder.
  - 6.3.3.3 Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
  - 6.3.3.4 Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  - 6.3.3.5 Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    - 6.3.3.5.1 Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

### 6.4 FINISHES

- 6.4.1 Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- 6.4.2 Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- 6.4.3 Steel Panels and Accessories:
  - 6.4.3.1 Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 6.4.3.2 Concealed Finish: Apply pretreatment and manufacturer's standard white or light-

colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil .

## PART 7 - EXECUTION

### 7.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
  - 1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
    - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 7.2 PREPARATION

- 7.2.1 Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

### 7.3 UNDERLAYMENT INSTALLATION

- 7.3.1 Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

- 7.3.1.1 Apply over the entire roof surface.

### 7.4 METAL PANEL INSTALLATION

- 7.4.1 General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 7.4.1.1 Shim or otherwise plumb substrates receiving metal panels.
  - 7.4.1.2 Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
  - 7.4.1.3 Install screw fasteners in predrilled holes.
    - 7.4.1.4 Locate and space fastenings in uniform vertical and horizontal alignment.
    - 7.4.1.5 Install flashing and trim as metal panel work proceeds.
  - 7.4.1.6 Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  - 7.4.1.7 Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
  - 7.4.1.8 Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

- 7.4.2 Fasteners:
  - 7.4.2.1 Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
- 7.4.3 Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- 7.4.4 Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- 7.4.5 Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.
  - 7.4.5.1 Install clips to supports with self-tapping fasteners.
  - 7.4.5.2 Install pressure plates at locations indicated in manufacturer's written installation instructions.
  - 7.4.5.3 Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
  - 7.4.5.4 Watertight Installation:
    - 7.4.5.4.1 Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
    - 7.4.5.4.2 Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    - 7.4.5.4.3 At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- 7.4.6 Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
  - 7.4.6.1 Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.
- 7.4.7 Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and 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 will be permanently watertight and weather resistant.
  - 7.4.7.1 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 achieve waterproof and weather-resistant performance.
  - 7.4.7.2 Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

7.4.8 Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

7.4.9 Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.

7.4.9.1 Provide elbows at base of downspouts to direct water away from building.

7.4.10 Roof Curbs: Install flashing around bases where they meet metal roof panels.

7.4.11 Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.

## 7.5 ERECTION TOLERANCES

7.5.1 Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

## 7.6 CLEANING AND PROTECTION

7.6.1 Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

7.6.2 Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113

END OF SECTION

## SECTION 079200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Silicone joint sealants.
  - 2. Mildew-resistant joint sealants.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
  - 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

#### 1.5 FIELD 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 or are below 40 deg F .
  - 2. When joint substrates are wet.
  - 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

#### 2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, 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.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:
  - 1. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
  - 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.

#### 2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dow Corning Corporation; 790
    - b. GE Silicones; SCS 9000



- c. Tremco: Spectrem I
- d. Pecora 890

### 2.3 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Pecora Corporation; 898
    - b. Tremco: Tremsil 200
    - c. Dow 999A
    - d. GE Silpruf SCS-1700

### 2.4 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

### 2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

## PART 3 - EXECUTION

### 3.1 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 performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. CMU.
    - b. Wood.
  - 3. Remove laitance and form-release agents from concrete.
  - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

- a. Metal.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by 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.

### 3.3 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 sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings 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 in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs 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 sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

### 3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.5

### 3.6 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, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079200

## SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes hollow-metal work.
- B. Related Requirements:
  - 1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

#### 1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

#### 1.4 COORDINATION

- A. Coordinate anchorage installation 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.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include the following:
  - 1. Elevations of each door type.
  - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
  - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  - 4. Locations of reinforcement and preparations for hardware.
  - 5. Details of each different wall opening condition.
  - 6. Details of anchorages, joints, field splices, and connections.
  - 7. Details of accessories.
  - 8. Details of moldings, removable stops, and glazing.
  - 9. Details of conduit and preparations for power, signal, and control systems.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

### 2.2 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

- A. Construct exterior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Maximum-Duty Doors and Frames: SDI A250.8, Level 4. At locations indicated in the Door and Frame Schedule.
  1. Physical Performance: Level A according to SDI A250.4.
  2. Doors:
    - a. Type: As indicated in the Door and Frame Schedule.
    - b. Thickness: 1-3/4 inches
    - c. Face: Metallic-coated steel sheet, minimum thickness of 0.067 inch , with minimum A40 coating.
    - d. Edge Construction: Model 2, Seamless.
    - e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
  3. Frames:
    - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch , with minimum A40 coating.
    - b. Construction: Face welded.
  4. Exposed Finish: Prime.

### 2.3 FRAME ANCHORS

- A. Jamb Anchors:
  1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, 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.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch , and as follows
- C. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

### 2.4 MATERIALS

- A. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- B. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
  1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class .

- C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- D. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- E. Grout: ASTM C 476, except with a maximum slump of 4 inches , as measured according to ASTM C 143/C 143M.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- G. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.5 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Doors:
  - 1. Vertical Edges for Single-Acting Doors: Bevel edges 1/8 inch in 2 inches .
  - 2. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets.
  - 3. Bottom Edge Closures: Close bottom edges of doors with end closures or channels of same material as face sheets.
  - 4. Exterior Doors: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
- C. Hollow-Metal Frames: 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.
  - 1. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
  - 2. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
  - 3. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, 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 one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
- D. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI

A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

F. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with **[butted]** [or] **[mitered]** hairline joints.

1. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
2. Provide loose stops and moldings on inside of hollow-metal work.
3. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.

## 2.6 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

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

## 2.7 ACCESSORIES

A. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick

B.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

### 3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
  1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - b. Remove temporary braces necessary for installation only after frames have been

- properly set and secured.
  - c. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
  - d. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
- 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
  - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
- 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
- 4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
  - a. Squareness: Plus or minus 1/16 inch , measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - b. Alignment: Plus or minus 1/16 inch , measured at jambs on a horizontal line parallel to plane of wall.
  - c. Twist: Plus or minus 1/16 inch , measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - d. Plumbness: Plus or minus 1/16 inch , measured at jambs at floor.
- C. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Non-Fire-Rated Steel Doors:
    - a. Between Door and Frame Jambs and Head: 1/8 inch plus or minus 1/32 inch .
    - b. Between Edges of Pairs of Doors: 1/8 inch to 1/4 inch plus or minus 1/32 inch .
    - c. At Bottom of Door: 5/8 inch plus or minus 1/32 inch .
    - d. Between Door Face and Stop: 1/16 inch to 1/8 inch plus or minus 1/32 inch .

### 3.4 ADJUSTING AND CLEANING

- A. 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.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

## SECTION 083113 - ACCESS DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Access doors and frames for walls and ceilings.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details materials, individual components and profiles, and finishes.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Detail fabrication and installation of access doors and frames for each type of substrate.

### PART 2 - PRODUCTS

#### 2.1 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- 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:
- B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
- C. Flush Access Doors with Exposed Flanges:
  - 1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
  - 2. Locations: Ceiling.
  - 3. Door Size: 24 inches x 36 inches
  - 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch , 16 gage.
    - a. Finish: Factory prime.
  - 5. Frame Material: Same material, thickness, and finish as door.
  - 6. Hinges: Manufacturer's standard.
  - 7. Hardware: Latch.
- D. Hardware:
  - 1. Latch: Self-latching bolt operated by screwdriver with interior release.

#### 2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Frame Anchors: Same type as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

#### 2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports



indicated.

1. Provide mounting holes in frames for attachment of units to metal or wood framing.

## 2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Steel and Metallic-Coated-Steel Finishes:
  1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
  2. Factory Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry-film thickness of 1 mil for topcoat.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

### 3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

## SECTION 087100 - DOOR HARDWARE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes:
  - 1. Mechanical door hardware for the following:
    - a. Swinging doors.
  - 2. Electrified door hardware.
- B. Related Sections:
  - 1. Section 081113 "Hollow Metal Doors and Frames"

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Other Action Submittals:
  - 1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
    - a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
    - b. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
    - c. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
    - d. Content: Include the following information:
      - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
      - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
      - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
      - 4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
      - 5) Fastenings and other pertinent information.
      - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
      - 7) Mounting locations for door hardware.
      - 8) List of related door devices specified in other Sections for each door and

frame.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For electrified door hardware, from the manufacturer.
- C. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware schedule.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor and Owner about door hardware and keying.
  - 1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
  - 2. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Source Limitations: Obtain each type of door hardware from a single manufacturer.
- C. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.
  - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf .
  - 2. Comply with the following maximum opening-force requirements:
    - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
  - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
  - 4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.
- E. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Inspect and discuss preparatory work performed by other trades.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.8 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or

replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
  - a. Structural failures including excessive deflection, cracking, or breakage.
  - b. Faulty operation of doors and door hardware.
  - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
2. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
  - a. Electromagnetic Locks: Five years from date of Substantial Completion.
  - b. Manual Closers: 10 years from date of Substantial Completion.

#### 1.10 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Provide parts and supplies that are the same as those used in the manufacture and installation of original products.

### PART 2 - PRODUCTS

#### 2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
  1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
  2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by descriptive titles corresponding to requirements specified in Part 2.

#### 2.2 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
  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. Hager
    - b. McKinney Products Company
    - c. Stanley Commercial Hardware; Division of The Stanley Works
- B. Antifriction-Bearing Hinges:
  1. Mounting: Full mortise (butts).
  2. Bearing Material: Ball bearing.
  3. Grade: Grade 1 (heavy weight).
  4. Base and Pin Metal:
    - a. Exterior Hinges: Stainless steel with stainless-steel pin.
    - b. Interior Hinges: Stainless steel with stainless-steel pin.
  5. Pins: Maximum security.
  6. Tips: Flat button.
  7. Corners: Square.

#### 2.3 MECHANICAL LOCKS AND LATCHES

- A. Bored Deadbolt Locks: BHMA A156.5: Grade 1 with strike that suits frame.

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. Schlage Deadbolt B663P
2. Backset: 2-3/4 inches .
3. Material: Stainless steel.
4. Deadlocks: Deadbolt operated by key outside and turn inside.

#### 2.4 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
- B. High-Security Lock Cylinders: BHMA A156.30; Grade 1; Type M, mechanical; permanent cores that are removable; face finished to match lockset.
  1. Number of Pins: Seven.
  2. Type: Bored-lock type.
- C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
- D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

#### 2.5 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
  1. Existing System:
    - a. Master key or grand master key locks to Owner's existing system.
  2. Keyed Alike: Key all cylinders to same change key.
- B. Keys: Brass.
  1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
    - a. Notation: Information to be furnished by Owner.

#### 2.6 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.
  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. Ives
    - b. Trimco
    - c. Don-Jo Mfg., Inc.
    - d. Hager Companies
    - e. Rockwood Manufacturing Company
- B. Flat Push Plates: 0.050 inch thick, 4 inches wide by 16 inches high with square corners and beveled edges; secured with exposed screws.
- C. Straight Pull-Plate Door Pulls: 0.050-inch-thick plate, 4 inches wide by 16 inches high with square corners and beveled edges; pull with minimum clearance of 1-1/2 inches from face of door.
  1. Type: 1-inch constant-diameter pull.
  2. Mounting: Surface applied with concealed fasteners.
  3. Overall Pull Length: 10 inch.

#### 2.7 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
  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. LCN
  - b. Norton
- B. Cast-Aluminum Surface Closers: Grade 1; Traditional Type with mechanism enclosed in cast-aluminum alloy shell.
1. Mounting: Parallel arm.
  2. Type: Heavy Duty Arm.
  3. Backcheck: Adjustable, effective between 60 and 85 degrees of door opening.
  4. Mounting Method: Vandal Resistant Torque Fasteners

## 2.8 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Pemko
    - b. Rixson Specialty Door Controls
    - c. National Guard Products, Inc.
- B. Adhesive-Backed Perimeter Gasketing: Vinyl bulb gasket material applied to frame rabbet with self-adhesive.
- C. Combination Door Shoe/Kick Plate: Thermoplastic elastomer gasket material held in place by aluminum housing; mounted to bottom edge of door with screws.
1. Extended Housing: Both sides of door up 3 inches.
  2. Mounting: Surface mounted on bottom edge of door.

## 2.9 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
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. Pemko
    - b. Rixson Specialty Door Controls
    - c. National Guard Products, Inc.
- B. Saddle Thresholds:
1. Type: Fluted top, barrier free.
  2. Base Metal: Aluminum.

## 2.10 FABRICATION

- A. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- B. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
  2. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

3. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

## 2.11 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

### 3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
  1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  2. Custom Steel Doors and Frames: HMMA 831.
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
  1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches .
- E. Lock Cylinders: Install construction cores to secure building and areas during construction period.
  1. Replace construction cores with permanent cores as directed by Owner.
- F. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, in equipment

room. Verify location with Owners Representative.

1. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.

G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

I. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.4 ADJUSTING

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

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

### 3.5 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

### 3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

### 3.7 DOOR HARDWARE SCHEDULE

#### Exterior Steel-Single (Door 2 and 4)

Quan	Item	Description	Manufacturer
2	DEADBOLT LOCKS	B663P X US32D	SCHLAGE
		Mount deadbolt locks at 16 inches and 52 inches from finish floor on door	
1	PULL PLATE	8303-0-US32D-4"X16"-G	IVES
1	PUSH PLATE	8300-0-US32D-4"X16"-G	IVES
4	HINGES	BB1168 4.5x4.5 US32D NRP	HAGER
1	WEATHERSTRIP	PK55BL	PEMKO
1	DOOR BOTTOM	221PK	PEMKO
1	THRESHOLD	2748A	PEMKO
1	CLOSER	4040-62PA-3077EDA-72MC	LCN

#### Exterior Steel-Single (Door 1 and 3)

Quan	Item	Description	Manufacturer
2	DEADBOLT LOCKS	B663P X US32D	SCHLAGE
		Mount deadbolt locks at 16 inches and 52 inches from finish floor on door	
1	PULL PLATE	8303-0-US32D-4"X16"-G	IVES
1	PUSH PLATE	8300-0-US32D-4"X16"-G	IVES
3	HINGES	BB1168 4.5x4.5 US32D NRP	HAGER



1	WEATHERSTRIP	PK55BL	PEMKO
1	DOOR BOTTOM	221PK	PEMKO
1	THRESHOLD	2748A	PEMKO
1	CLOSER	4040-62PA-3077EDA-72MC	LCN

END OF SECTION 087100  
SECTION 099113 - EXTERIOR PAINTING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
  1. Galvanized metal.
  2. Aluminum (not anodized or otherwise coated).
- B. Related Requirements:
  1. Section 099600 "Anti Graffiti Coatings" for special-use coatings.
  2. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.
  3. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.

### 1.4 MAINTENANCE MATERIAL SUBMITTALS

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

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F .
  1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

### 1.6 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F .
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- 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. Sherwin-Williams Company

2. ICI Paints
3. Kelly-Moore Paints
4. Benjamin Moore & Co.
- 2.2 PAINT, GENERAL
  - A. Material Compatibility:
    1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
    2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
  - B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
  - C. Colors: As selected by Owners Representative from manufacturer's full range.
- 2.3 METAL PRIMERS
  - A. Primer, Galvanized: As recommended in writing by topcoat manufacturer.
  - B. Primer, Quick Dry, for Aluminum - as recommended in writing by topcoat manufacturer:
- 2.4 WATER-BASED PAINTS
  - A. Light Industrial Coating, Exterior, Water Based (Gloss Level 3):
    1. DTM (Direct to Metal) Acrylic Coating.
- 2.5 ALUMINUM PAINT
  - A. Aluminum Paint:
    1. DTM (Direct to Metal) Acrylic Coating.

### PART 3 - EXECUTION

- 3.1 EXAMINATION
  - A. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
  - B. Proceed with coating application only after unsatisfactory conditions have been corrected.
    1. Application of coating indicates acceptance of surfaces and conditions.
- 3.2 PREPARATION
  - A. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
    1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
  - B. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
    1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
  - C. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
  - D. Aluminum Substrates: Remove loose surface oxidation.
- 3.3 APPLICATION
  - A. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
- 3.5 CLEANING AND PROTECTION
  - A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
  - B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
  - C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Owners Representative, and leave in an undamaged condition.
  - D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
- 3.6 EXTERIOR PAINTING SCHEDULE
  - A. Galvanized-Metal Substrates: Hollow Metal Doors/Frames, Handrails
    - 1. Water-Based Light Industrial Coating System:
      - a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
      - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
      - c. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3).
  - B. Aluminum Substrates: Mechanical Louvers
    - 1. Water-Based Light Industrial Coating System:
      - a. Prime Coat: Primer, quick dry, for aluminum.
      - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
      - c. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3).

END OF SECTION 099113

## SECTION 0 99 600 - ANTI-GRAFFITI COATINGS

### 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 surface preparation and application of anti-graffiti coating systems for the following vertical surfaces:
  - 1. Exterior:
    - a. Exposed CMU – unpainted
- B. Related Sections include the following:
  - 1. Division 07 Section "Joint Sealants".
  - 2. Division 09 painting Sections for paints and coatings.

#### 1.3 SUBMITTALS

- A. Product Data: For each coating system indicated. Include primers and undercoats.
  - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
  - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing and applying each material specified.
- B. Certification by manufacturer that products supplied comply with requirements indicated that limit the amount of VOCs in coating products.
- C. Warranty: Special warranty specified in this Section

#### 1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed anti-graffiti coating system applications similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.
- B. Source Limitations: Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label with the following information:

1. Name or title of material.
  2. Product description (generic classification or binder type).
  3. Manufacturer's stock number and date of manufacture.
  4. Contents by volume, for vehicle constituents.
  5. Thinning instructions
  6. Application instructions
  7. Handling instructions and precautions.
- A. Store materials not in use in tightly covered containers in a well-ventilated area at a temperature range between 40 and 95 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
1. Protect materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing and applying coatings.
- 1.6 PROJECT CONDITIONS
- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 45 and 85 deg F.
- B. Limitations: Proceed with application only when the following existing and forecasted weather and substrate conditions permit coatings to be applied according to manufacturers' written instructions and warranty requirements:
1. Concrete surfaces and mortar have cured for more than 28 days.
  2. Rain or snow is not predicated within 24 hours.
  3. Application proceeds more than 24 hours after surfaces have been wet, unless otherwise recommended by manufacturer.
  4. Windy conditions do not exist that may cause anti-graffiti coatings to be blown onto vegetation or surfaces not intended to be treated.
- C. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with a continuing coating operation.
  2. Work may continue during inclement weather only if areas and surfaces to be coated are enclosed and temperature within the area can be maintained within limits specified by manufacturer during application and drying periods.
- 1.7 WARRANTY
- A. Special Warranty: Manufacturer's standard form in which manufacturer and applicator agree(s) to repair or replace materials that fail to maintain graffiti repellency within specified warranty period.
1. Warranty Period: Provide manufacturers 2 Year Graffiti Protection Warranty

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: To coordinate with City of Sparks existing building maintenance operations, provide the following:
1. Evonik Industries-Protectosil CHEM-TRETE PB VOC (High performance, penetrating water repellent)
  2. Bithell Inc. VITROCEM ANTI-GRAFFITI GLAZED COATING SYSTEM

### 2.2 COATINGS MATERIALS, GENERAL

- A. Material Compatibility: Provide primers, undercoats, and finish-coat materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's highest grade of the various anti-graffiti coatings specified. Materials not displaying manufacturer's product identification are not acceptable.
1. Proprietary Names: Use of manufacturer's proprietary product names to designate

materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

- C. VOC Classification: Provide anti-graffiti coating materials, that have a VOC classification of 450 g/L or less.

## 2.3 EXTERIOR ANTI-GRAFFITI COATING SYSTEMS

- A. Provide the following coating system over exterior split-faced concrete masonry vertical surfaces:
  - 1. First Product: Evonik Industries Protectosil CHEM-TRETE PB VOC Water Repellent – 1 flood coat per manufacturer's installation instructions.
  - 2. Second Product: Bithell, Inc., VITROCEM Clear Polyester by spray or roller. Rate will vary depending on surface porosity, completely fill all surface voids. After first coat has cured, provide second coat – final surface appearance shall be free of surface voids and pinholes.
  - 3. Third Product: Bithell, Inc., VITROCEM Clear Glaze by spray.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. With Applicator present, examine substrates and conditions under which anti-graffiti coatings will be applied, for compliance with coating application requirements.
  - 1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
  - 2. Start of application is construed as Applicator's acceptance of surfaces within that particular area.
- B. Coordination of Work: Review other Sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of specified finish materials to ensure compatible primers.

### 3.2 PREPARATION

- A. General: Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
  - 1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
- B. Cleaning: Before applying anti-graffiti coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.
  - 1. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fail on wet, newly coated surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be treated according to manufacturer's written instructions for each substrate condition and as specified.
  - 1. Prepare concrete masonry block, surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.
    - a. Use abrasive blast-cleaning methods if recommended by coating manufacturer.
    - b. Do not coat surfaces if moisture content exceeds that permitted in manufacturer's written instructions.
- D. Material Preparation: Use material as furnished by Manufacturer in labeled and batch numbered. **DO NOT DILUTE**. Vitrocem Coatings require the addition of catalyst just prior to use. Atmospheric conditions affect the curing. Follow Manufacturer's printed directions regarding catalyst concentrations at varying temperatures.
- E. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of coating system components. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of components being deposited on surfaces. Cover live plants and grass.
- F. Coordination with Sealants: Do not apply anti-graffiti coatings until sealants for joints adjacent to

surfaces receiving coatings have been installed and cured.

1. Anti-graffiti coating work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, anti-graffiti coatings, and sealant materials identical to those used in the work.

G. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.3 APPLICATION

A. Manufacturer's Field Service: Engage a factory-authorized service representative to instruct Applicator on the product and application method to be used.

B. General: Apply anti-graffiti coatings according to manufacturer's written instructions.

1. Use applicators and techniques best suited for the material being applied.
2. Do not apply anti-graffiti coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film. Coating surface treatments and finishes are indicated in the coating system descriptions.
3. Provide finish coats compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convectors covers, grilles, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.

### 3.4 CLEANING

A. Immediately clean anti-graffiti coatings from adjoining surfaces and surfaces soiled or damaged by application as work progresses. Repair damage caused by application. Comply with manufacturer's written cleaning instructions.

### 3.5 PROTECTION

A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Owners Representative, and leave in an undamaged condition.

1. Provide "Wet Paint" signs to protect newly coated finished. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.

END OF SECTION 09 96

## SECTION 10 14 23 – BUILDING SIGNAGE

### PART 1 – GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Exterior Identification Signage.

#### 1.2 REGULATORY REQUIREMENTS

- A. ADAAG - Americans with Disabilities Act Accessibility Guidelines; Federal Register with most current adopted sections.
- B. CABO/ANSI A117.1 - Accessible and Usable Buildings and Facilities; American National Standards Institute, Inc.

#### 1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications, installation instructions, and general recommendations for each major product required. Include data substantiating that products to be furnished comply with requirements of the contract documents.
- B. Provide the required copies of:
  - 1. Product data sheets.
  - 2. Installation instructions.
- C. Verification Samples: To verify compliance with requirements of contract documents, submit one sample of each item selected.
- D. Shop Drawings: Provide shop drawings for fabrication and erection of signs. Include plans, elevations and sections as required. Show accessories and installation details.
  - 1. Provide a schedule of all signage text, Braille and pictograms (where applicable) accompanied by a full-size elevation of sign.
- E. Maintenance Data: Submit manufacturer's instructions for proper maintenance materials and procedures.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain required products from a single manufacturer.
- B. Provide signage that complies with CABO/ANSI A117.1 and ADAAG standards.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS:

- A. Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Kroy Sign Systems LLC
  - b. ASI Sign Systems, Inc.
  - c. Best Manufacturing Co.
  - d. Vomar Products, Inc.
- B. Sign Materials:
  - 1. Cast acrylic sheet: Provide cast (not extruded or continuous cast) methyl methacrylate monomer plastic sheet with a minimum flexural strength of 16,000 psi when tested in accordance with ASTM D 790, a minimum allowable continuous service temperature of 176 degrees F (80 degrees C).
- D. Exterior Signs:
  - 1. Unframed signs:
    - a. Acrylic face sheet thickness: 1/8 inch thick.
    - b. Edge condition: Square cut.



- c. Corner Condition: Square cut.
- d. Raised Copy: Machine-cut copy characters from matte-finish opaque acrylic sheet and chemically weld onto the acrylic sheet forming the sign face.
  - 1. Copy character thickness: 1/32 inch.
- e. Engraved Copy: Engraved copy shall be produced into acrylic face sheet in precisely formed characters.
  - 1. Grade 2 Braille shall be included in all applicable signs.
- f. Sign shall be sized to adequately display text noted for each sign. Minimum size: 6 inches x 6 inches.
- g. Font: Gill Sans MT
- E. Colors: Colors of face sheets and raised copy shall be as selected by the Owners Representative from the standard colors after the award of the contract.
- F. Mounting: Attach signs to wall surfaces as follows:
  - 1. Projected Mounting: W/ tamper proof headed screw into CMU

## 2.2 SIGNAGE SCHEDULE

- A. Signage schedule is included at the end of this Section.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Inspect substrates and conditions under which the work of this section will be performed, and verify that installation properly may commence. Do not proceed with the work until unsatisfactory conditions have been resolved fully.

### 3.2 INSTALLATION

- A. General: Comply with manufacturer's instructions, except where more stringent requirements are shown or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
- B. Mount in accordance with referenced regulatory requirements.

### 3.3 CLEANING

- A. Upon completion, clean all surfaces that have become soiled or coated as a result of work of this section, using proper methods that will not scratch or otherwise damage finished surfaces.
- B. Remove all traces of protective coatings or paper.
- C. Clean all exposed surfaces after installation.

### 3.4 PROTECTION

- A. General: Institute protective procedures and install protective materials as required to ensure that work of this section will be without damage or deterioration at substantial completion.

## Signage Schedule

Door #	Location	Text 1st line	Text 2nd line	Sign Type	Pictogram A	Pictogram B
1	Exterior	Women'		A	ISA	Woman
2	Exterior	Men's		A	ISA	Man
3	Exterior	Janitor		A		
4	Exterior	Storage		B		

Should the actual layout allow for different dimensions, Contractor may propose different configurations provided the text requirements are met. Should the sizes be revised all signs will be required to have a constant width or height dimension for all signs.

All text is 1/32 inch high by 5/8 inch tall with associated Braille as required.

Text Notes:

1. "ISA" refers to the International Symbol of Accessibility.

END OF SECTION 101423

## SECTION 102113 - TOILET COMPARTMENTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Solid-polymer toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Sections:
  - 1. Section 061000 "Rough Carpentry" for blocking, overhead support of floor-and-ceiling-anchored compartments, and overhead support of post-to-ceiling screens.
  - 2. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Show locations of centerlines of toilet fixtures.
  - 2. Show overhead support or bracing locations.
- C. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

#### 1.4 CLOSEOUT SUBMITTALS

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

#### 1.5 QUALITY ASSURANCE

- A. Comply with requirements in GSA's CID-A-A-60003, "Partitions, Toilets, Complete."
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 75 or less.
  - 2. Smoke-Developed Index: 450 or less.
- C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

#### 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221 .
- C. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- D. Stainless-Steel Castings: ASTM A 743/A 743M.

#### 2.2 SOLID-POLYMER UNITS

- 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. Accurate Partions Corporation
  - 2. Ampco
  - 3. General Partitions Mfg. Corp.
  - 4. Global Steel Products Corp.
  - 5. Santana Products, Inc.

- B. Toilet-Enclosure Style: Floor and ceiling anchored.
  - C. Door, and Pilaster Construction: Solid, high-density polyethylene (HDPE) or polypropylene (PP) panel material, not less than 1 inch thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.
    - 1. Color and Pattern: One color and pattern in each room as selected by Owners Representative from manufacturer's full range.
  - D. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.
  - E. Brackets (Fittings):
    - 1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
  - F. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
    - 1. Material: Stainless steel.
    - 2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed or partially open position.
    - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
    - 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
    - 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
    - 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
  - G. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.
- 2.3 FABRICATION
- A. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
  - B. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.
- PART 3 - EXECUTION
- 3.1 INSTALLATION
- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
    - 1. Maximum Clearances:
      - a. Pilasters and Panels: 1/2 inch .
      - b. Panels and Walls: 1 inch .
  - B. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.
- 3.2 ADJUSTING
- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in entrance screens to return doors to fully closed position.

END OF SECTION 102113

## SECTION 102800 - TOILET ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Public-use washroom accessories.
  - 2. Warm-air dryers.
  - 3. Custodial accessories.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
  - 1. Construction details and dimensions.
  - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Material and finish descriptions.
  - 4. Manufacturer's warranty.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.
- B. 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.

#### 1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

#### 2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements,
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - 1. Bobrick
  - 2. American Specialties, Inc.
- C. Grab Bars F/M/U:
  - 1. Basis-of-Design Product: Bobrick Toilet Compartment Bar..

2. Mounting: Flanges with concealed fasteners.
  3. Material: Stainless steel, 0.05 inch thick.
    - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
  4. Outside Diameter: 1-1/2 inches .
  5. Configuration and Length: Straight, 36 inches long (F); 42 inches long (M); 18 inches long (U).
- D. Sanitary-Napkin Disposal Unit J:
1. Basis-of-Design Product: Bobrick B-270 Contura Series.
  2. Mounting: Surface mounted.
  3. Door or Cover: Self-closing, disposal-opening cover.
  4. Receptacle: Removable.
  5. Material and Finish: Stainless steel, No. 4 finish (satin).
- 2.3 WARM-AIR DRYERS
- A. Warm-Air Dryer A:
1. Basis-of-Design Product: Dyson Airblade V Hand Dryer.
  2. Mounting: Surface mounted.
  3. Operation: Electronic-sensor activated with timed power cut-off switch.
    - a. Operation Time: 30 to 40 seconds.
  4. Cover Material and Finish: Molded plastic, gray.
  5. Electrical Requirements: 110-127 V, 15A, 1400 W.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf , when tested according to ASTM F 446.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

## SECTION 22 00 00 – PLUMBING

### PART 1 GENERAL

#### 1.1 CONDITIONS OF THE CONTRACT:

- A. This section is a general requirements Plumbing section and is a part of each Plumbing section making reference to Plumbing related work.
- B. For convenience or reference the Specifications are separated into Divisions and Sections. Such separations shall not operate to make the Engineer an arbitrator to establish subcontract limits between the Prime Contractor and his Subcontractors. In any case, the Prime Contractor is responsible to the owner for a complete job.

#### 1.2 WORK INCLUDED:

- A. This section consists of General Requirements and Standard Specifications covering certain parts of Plumbing work and is supplemented by other Division 22 specification sections covering additional work, requirements, and materials specifically applicable to the Plumbing work of each section. Requirements of subsequent sections of the specifications, if in conflict with these General Requirements, shall govern.

#### 1.3 REQUIREMENTS OF REGULATORY AGENCIES:

- A. Provide work and materials in full accordance with the latest rules and regulations of the following:
  - 2015 - Michigan Building Code. 2015
  - Michigan Mechanical Code. 2018 -
  - Michigan Plumbing Code.
- B. Nothing in Drawings or specifications shall be construed to permit work not conforming to these codes.
- C. When Contract Documents differ from governing codes, furnish and install larger size or higher standards called for without extra charge.
- D. No material installed as part of this WORK shall contain asbestos in any form.

#### 1.4 FEES, PERMITS, AND UTILITY SERVICES:

- A. Obtain and pay for all permits and service required in installation of this work; arrange for required inspections and secure approvals from authorities having jurisdiction. Arrange for utility connections and pay charges incurred, including excess service charges, if any.

#### 1.5 SITE EXAMINATION:

- A. Examine site, verify dimensions and locations against Drawings, and inform self of conditions under which work is to be done before submitting proposal. No allowance will be made for extra expense on account of error.
- B. Information shown relative to existing services is based upon available records and data but is approximate only. Make minor deviations found necessary to conform with actual locations and conditions without extra cost. Verify location and elevation of utilities prior to commencement of excavation for new piping or its installation.
- C. Exercise extreme care in excavating near existing utilities to avoid any damage thereto. This Contractor is responsible for any damage caused by his operations.

#### 1.6 MATERIAL LIST AND SUBSTITUTIONS:

- A. Prior to commencement of work, and within 35 days after award of Contract, submit to Owners Representative for review copy of a complete list of equipment and materials to be furnished, including all substitutions. Substitutions will be interpreted to be all manufacturers other than those specifically listed by model or catalog number.
- B. Partial or incomplete lists of material will not be considered.
- C. Only one request for substitution will be considered on each item of material or equipment. No substitutions will be considered thereafter.
- D. Quantities are the Contractor's responsibility and will not be reviewed.
- E. If Contractor desires to make a substitution, he shall submit complete information or catalog data to show equality of equipment or material offered to that specified. No substitutions will be allowed unless requested and reviewed in writing. The Owners Representative shall review and take appropriate action on shop Drawings, product data, samples, and other submittals required by the Contract Documents. Such review shall be

only for general conformance with the design concept and general compliance with the information given in the Contract Documents. It shall not include review of quantities, dimensions, weights or gauges, fabrication processes, construction methods, coordination with the work of other trades, or construction safety precautions, all of which are the sole responsibility of the Contractor. Review of a specific item shall not indicate acceptance of an assembly of which the item is a component. The Owners Representative shall not be required to review and shall not be responsible for any deviations from the Contract Documents not clearly noted by the Contractor, nor shall the Owners Representative be required to review partial submissions or those for which submissions for correlated items have not been received.

- F. Installation of reviewed substitution is Contractor's responsibility. Any changes required for installation of reviewed substituted equipment must be made without additional cost. Review by the Owners Representative of the substituted equipment and/or dimensional Drawings does not waive these requirements.

## PART 2 PRODUCTS

### 2.1 MATERIALS:

- A. Provide factory-fabricated piping specialties and valves recommended by manufacturer for use in service indicated. Provide piping specialties of types and pressure ratings indicated for each service, or if not indicated, provide proper selection as determined by Contractor to comply with installation requirements. Provide sizes and connections which properly mate with pipe, tube, and equipment connections. Where more than one type is indicated, selection is Contractor's option.
- B. Unless otherwise indicated, provide valves of same size as upstream pipe size.

### 2.2 MATERIALS AND EQUIPMENT:

- A. Mention herein or on Drawings requires that this Contractor provide each item listed of quality noted or equal. All material shall be new, full weight, standard in all respects, and in first- class condition. Provide materials of the same brand or manufacture throughout for each class of material or equipment wherever possible. Materials shall be tested within the Continental United States by independent, nationally recognized testing agency and shall be listed in accordance with testing agency requirements.
- B. The grade or quality of materials desired is indicated by the trade names or catalog numbers stated herein.
- C. Dimensions, sizes, and capacities shown are a minimum and shall not be changed without permission of the Owners Representative.

### 2.3 MATERIALS FURNISHED:

- A. Identify all materials and equipment by manufacturer's name and model number. Remove unidentified materials and equipment from site.
- B. Equipment specified by manufacturer's number shall include all accessories, controls, etc. listed in catalog as standard with equipment. Furnish optional or additional accessories as specified.
- C. Equipment or material damaged during transportation, installation, or operation is considered as totally damaged. Replace with new equipment. Variance from this permitted only with written consent of the Owners Representative.

## PART 3 EXECUTION

### 3.1 ACCESS TO PLUMBING WORK:

- A. Comply with manufacturer's instructions for installation of access doors.
  - B. Access panels shall be furnished and installed wherever valves, balance valves, damper operating mechanisms, air terminal boxes, fans, and similar items normally requiring adjustment or servicing are installed in concealed or inaccessible spaces. Coordinate with access doors shown on architectural Drawings.

### 3.2 DRAWINGS AND COORDINATION:

- A. General arrangement and location of piping, ductwork, equipment, etc. are shown on



Drawings or herein specified. Carefully examine other work that may conflict with this work. Install this work in harmony with other crafts and at proper time to avoid delay of work.

- B. In advance of construction, work out minor changes and relocations to suit actual conditions and work of other trades to avoid conflict therewith. This shall not be cause for additional cost.

3.3 ACCESS:

- A. Continuously check Architectural Drawings for clearance and accessibility of equipment specified herein to be placed. No allowance of any kind will be made for negligence on part of Contractor to foresee means of installing his equipment into proper position.

3.4 CLOSING IN OF UNINSPECTED WORK:

- A. Do not allow or cause work installed to be covered up or enclosed before it has been inspected and tested. Should work be enclosed or covered up before it has been inspected and tested, uncover work at own expense. After it has been inspected and tested, make repairs necessary to restore work of other contractors to condition in which it was found at time of cutting.

3.5 PROJECT MODIFICATIONS:

- A. During the progress of construction, if such conditions arise that require revisions, modifications, or relocations to any mechanical equipment or materials incorporated in this project, such alterations shall be immediately called to the attention of the Owners Representative. Contractor shall then prepare necessary Drawings showing proposed changes. Submit proposed changes for review by the Owners Representative prior to actual revision work in the field.
- B. Two sets of Drawings showing all revisions shall be immediately presented to Owners Representative for his records. Maintain additional copies on the project as necessary to comply with "RECORD DRAWINGS" requirement of the General Requirements.
- C. Incorporate all revisions into record Drawings.

3.6 FORMING, CUTTING AND PATCHING:

- A. Coordinate with other contractors as necessary to provide any special forming, recesses, chases, etc., and provide wood blocking, backing, and grounds as necessary for proper installation of mechanical work.
- B. If this Contractor fails to coordinate with other contractors at proper time or fails to locate items properly, resulting in extra work, then this Contractor is responsible.
- C. This Contractor is responsible for proper placement of pipe sleeves, hangers, inserts, and supports for work.
- D. Cutting, patching, and repairing of existing (old) construction to permit installation of piping, etc. is responsibility of this Contractor. Repair or replace damage to existing work with skilled mechanics for each trade involved in first-class manner.

3.7 GUARANTEE:

- A. Be responsible for work done and material installed under these plans and specifications. Repair or replace, as may be necessary, any defective work, material, or part which may show itself within one year of filing of Notice of Completion and be responsible for damage to other materials, furnishing, equipment, or premises caused by such defects during this period, if in the opinion of the Owners Representative said defect is due to imperfection of material or workmanship. Provide all such work and materials at no cost to Owner.
- B. Be responsible for damage to any part of premises during guarantee period caused by leaks or breaks in work furnished and/or installed under this section.

3.8 RECORD DRAWINGS:

- A. Upon completion of work covered by this Contract, furnish Owners Representative with record drawings, showing all changes of piping, ductwork, etc. within building and installed under this Contract which are not in accord with these Drawings for the work. Record drawing deliverables to consist of the following:

3.9 PROJECT COMPLETION TESTS AND START-UP:

- A. Upon completion of the mechanical work, or at such time prior to completion as may be determined by the Owners Representative, operate and test all mechanical equipment and systems for a period of at least five consecutive 8-hour days to demonstrate the satisfactory overall operation of the building or project as a complete unit.
- B. Provide training and orientation of Owners operating staff in proper care and operation of equipment, systems and controls.
- C. During test period, make final adjustments and balancing of equipment so that all are placed in first-class operating condition.
- D. Mark final positions of balancing valves after balancing is complete.
- E. Final observation will not be made until all of the above have been completed and balance report has been submitted and reviewed.

3.10 CLEANING UP:

- A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

SECTION 22 01 00 - OPERATION AND MAINTENANCE OF PLUMBING

PART 1 GENERAL

1.1 CONDITIONS OF THE CONTRACT:

- A. The Conditions of the Contract (General, Supplementary, and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.

1.2 WORK INCLUDED:

- A. This section consists of General Requirements and Standard Specifications covering certain parts of the Plumbing work and is supplemented by other Specification sections covering additional work, requirements, and materials specifically applicable to the work of each section. Requirements of subsequent sections of the specifications, if in conflict with these Requirements, shall govern.

1.3 MAINTENANCE AND OPERATING INSTRUCTIONS:

- A. Furnish Owner with two complete sets of typewritten operating and maintenance instructions, descriptive literature, catalog cuts, and diagrams covering all items of operation and maintenance for each and every mechanical system and piece of equipment furnished under these specifications.

PART 2 PRODUCTS (Not  
Applicable) PART 3 EXECUTION  
(Not Applicable)

3.1 WINTERIZATION

- A. The building's plumbing systems shall be constructed in such a manner to allow for the owner to winterize the system on annual basis. This contractor shall be responsible for developing and documenting these winterization measures. Submit a copy of the winterization procedure to the owner for his/her review prior to construction. Upon approval, the procedure shall be placed in the operating and maintenance binders referenced above. This contractor shall be responsible to train the owner's technical representative on the procedures to be utilized in the winterization process.

END OF SECTION

## SECTION 22 10 00 - FACILITY WATER DISTRIBUTION

### PART 1 GENERAL

#### 1.1 CONDITIONS OF THE CONTRACT:

- A. The Conditions of the Contract (General, Supplementary, and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.
- B. The Plumbing section 22 00 00 and Common Work Results for Plumbing section 22 05 00 are hereby made a part of this Section.

#### 1.2 WORK INCLUDED

- A. Types of plumbing piping systems specified in this section include the following: Water Piping  
QUALITY ASSURANCE:
- B. Manufacturer's Qualifications: Firms regularly engaged in manufacture of plumbing piping systems products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than 5 years.
- C. Contractor's Qualifications: Firm with at least 5 years of successful installation experience on projects with piping systems work similar to that required for project.
- D. Requirements of Regulatory Agencies:
  - 1. Plumbing Code Compliance: Comply with applicable portions of Uniform Plumbing Code pertaining to selection and installation of plumbing materials and products.

#### 1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical product data and installation instructions for plumbing piping systems materials and products.
- B. Record Drawings: At project closeout, submit Record Drawings of installed piping systems, in accordance with requirements of Division 1.
- C. Maintenance Data: Submit maintenance data and parts lists for plumbing piping systems materials and products. Include this data, product data, shop drawings, and record drawings in maintenance manual; in accordance with requirements of Division 1.

### PART 2 PRODUCTS

#### 2.1 MATERIALS AND PRODUCTS:

- A. Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Provide materials and products complying with Uniform Plumbing Code. Where more than one type of material or product is indicated, selection is Contractor's option.

#### 2.2 BASIC PIPES AND PIPE FITTINGS:

##### 1.1 SECTION INCLUDES

- A. PEX-a or approved equal pipe and fittings for domestic water piping.

##### 1.2 RELATED SECTIONS

##### 1.3 REFERENCES

- A. ASTM International (ASTM):
  - 1. ASTM D 2765 - Test Methods for Determination of Gel Content and Swell Ratio of Crosslinked Ethylene Plastics.
  - 2. ASTM D 6394 - Specification for Sulfone Plastics (SP).
  - 3. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

4. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
  5. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
  6. ASTM F 876 - Standard Specification for Cross-linked Polyethylene (PEX) Tubing.
  7. ASTM F 877 - Standard Specification for Cross-linked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems.
  8. ASTM F 1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing.
- B. American Water Works Association:
1. AWWA C904 Standard for Cross-linked Polyethylene (PEX) Pressure Pipe, 1/2 in. Through 3 in., for Water Service.
- C. American National Standards Institute (ANSI)/National Sanitation Foundation (NSF)
1. ANSI/NSF Standard 14 Plastics Piping System Components and Related Materials.
  2. ANSI/NSF Standard 61 Drinking Water System Components - Health Effects.
  3. ANSI/NSF Standard 359 Valves for Crosslinked Polyethylene (Pex) Water Distribution Tubing Systems.
- D. American National Standards Institute (ANSI)/Underwriters Laboratories, Inc. (UL)
1. ANSI/UL 263 Standard for Safety for Fire Tests of Building Construction and Materials.
- E. Canadian Standards Association (CSA)
1. CAN/CSA B137.5 Cross-linked Polyethylene (PEX) Tubing Systems for Pressure Applications.
- F. International Code Council (ICC)
1. International Plumbing Code (IPC)
- G. International Association of Plumbing Officials (IAPMO)
1. Uniform Plumbing Code (UPC)
- H. National Association of Plumbing, Heating and Cooling Contractors (NAPHCC)
1. National Standard Plumbing Code (NSPC)
- I. Plastics Pipe Institute (PPI)
1. PPI Technical Report TR-4/06
- J. Uponor, Inc.
1. Uponor Professional Plumbing Installation Guide (UPPIG), 2013.
  2. Uponor Plumbing Design Assistance Manual (PDAM), 2014.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Provide manufacturer's product submittal data.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Installer shall have demonstrated experience on projects of similar size and complexity with documentation proving successful completion of plumbing system installation and/or training by the PEX tubing manufacturer.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.
- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged

containers with identification labels intact.

- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
  - 1. Store PEX tubing in cartons or under cover to avoid dirt or foreign material from entering the tubing.
  - 2. Do not expose PEX tubing to direct sunlight for more than 30 days. If construction delays are encountered, cover the tubing to prevent exposure to direct sunlight

#### 1.7 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer's Warranty: PEX-a manufacturer system warranty shall cover piping and fittings for a duration of 25 years from the date of installation. Piping system warranty shall apply to potable water distribution and water service systems constructed of pipe and fitting products sourced from the same manufacturer.



SECTION 22 11 16  
DOMESTIC PIPING - PEX FITTINGS AND PIPING

PART 6 GENERAL

6.1 SECTION INCLUDES

- A. PEX system fittings.
- B. Potable Water PEX piping.
- C. Oxygen Barrier PEX piping.
- D. Reclaimed water PEX piping.
- E. Potable water PE-RT piping.
- F. RELATED SECTIONS
- G. Section 22 40 00 - Plumbing Fixtures (22 10 00) - Plumbing Piping.
- H. Section 22 41 39 - Residential Faucets, Supplies, and Trim (22 42 02) - Plumbing Fixtures.
- I. REFERENCES
- J. ASTM International (ASTM):
  - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 2. ASTM F876 - Standard Specification for Crosslinked Polyethylene (PEX) Tubing.
  - 3. ASTM F877 - Standard Specification for Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems.
  - 4. ASTM F1807 - Standard Specification for Metal Insert Fittings Utilizing a Copper Crimp Ring, or Alternate Stainless Steel Clamps, for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing.
  - 5. ASTM F2023 - Standard Test Method for Evaluating the Oxidative Resistance of Crosslinked Polyethylene (PEX) Pipe, Tubing and Systems to Hot Chlorinated Water.
  - 6. ASTM F2098 - Standard Specification for Stainless Steel Clamps for Securing SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) to Metal Insert and Plastic Insert Fittings.
  - 7. ASTM F2159 - Standard Specification for Plastic Insert Fittings Utilizing a Copper Crimp Ring, or Alternate Stainless Steel Clamps for SDR9 Crosslinked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing.
  - 8. ASTM F2657 - Standard Test Method for Outdoor Weathering Exposure of Crosslinked Polyethylene (PEX) Tubing.
  - 9. ASTM F2769 - Standard Specification for Polyethylene of Raised Temperature (PE-RT) Plastic Hot and Cold-Water Tubing and Distribution Systems.
- K. American National Standards Institute (ANSI):
- L. American Society of Sanitation Engineers (ASSE):
  - 1. ASSE 1061 - Performance Requirements for Push-Fit Fittings.
- M. American Water Works Association (AWWA):
  - 1. AWWA C904 - Cross-Linked Polyethylene (PEX) Pressure Pipe, 1/2 inch (12 mm) Through 3 inches (76 mm) for Water Service.
- N. Canadian Standards Association (CSA):
  - 1. CSA B125.3 - Plumbing Fittings.
  - 2. CSA B137.5 - Crosslinked polyethylene (PEX) tubing systems for pressure applications.
- O. National Products of Canada(NPC).

- P. National Science Foundation (NSF):
  - 1. NSF/ANSI 61 - Drinking Water System Components - Health Effects.
  - 2. NSF/ANSI 372 - Drinking Water System Components - Lead Content.
- Q. Underwriters Laboratories (UL):
  - 1. UL 1821 - UL Standard for Safety Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service.
- R. Underwriters Laboratories Canada (ULC):
  - 1. CAN/ULC S102.2 - Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.
  - 2. CAN/ULC S101 - Standard Methods of Fire Endurance Tests of Building Construction and Materials

## 6.2 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data:
  - 1. Manufacturer's data sheets on each product to be used.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Typical installation methods.
- C. Verification Samples: Two representative units of each type, size, pattern, and color.

## 6.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

## 6.4 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- B. Protect from damage due to weather, excessive temperature, and construction operations.

## 6.5 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

## 6.6 WARRANTY

- A. Manufacturer's standard limited warranty unless indicated otherwise.

## PART 7 PRODUCTS

### 7.1 MANUFACTURERS

- A. Acceptable Manufacturer: RWC Canada, which is located at: 74 Alex Ave.; Vaughan, ON, Canada L4L 5X1; Toll Free Tel: 888-820-0120; Tel: 905-265-2790; Email: [request info \(info-ask@rwc.com\)](mailto:request info (info-ask@rwc.com)); Web: <https://www.rwc.com>
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.



## 7.2 PEX SYSTEM FITTINGS

- A. Basis of Design: SharkBite EvoPEX pipe fittings.
1. For use in hot and cold domestic water systems, as well as radiant heating/cooling systems.
  2. SharkBite EvoPEX fittings are intended to be installed with SharkBite PEX pipe as a holistic system.
  3. Securely and permanently connect two pieces of PEX pipe together.
  4. PEX fittings require no special tools.
  5. Fittings are rotatable after installation and a permanent solution.
  6. Green Visual Indicator: Appears on PEX connectors when tubing is inserted to proper depth, reducing risk of errors.
  7. Standards Compliance: SharkBite EvoPEX fittings 1/2, 3/4 and 1 inch (12, 76, 25 mm):
    - a. Certified to ASSE 1061 and CSA B125.3 standards and CSA B137.5.
    - b. Listed to ASSE 1061, NSF/ANSI 61, NSF 372, by IAPMO and CSA.
    - c. UPC, IPC, and NPC of Canada compliant.
    - d. Performance: A potable water or radiant heating/cooling system.
    - e. Pressure at Temperature Ratings.
      - 1) 80 psi (551.6 kPa) at 200 degrees F (93 degrees C).
      - 2) 100 psi (689.5 kPa) at 180 degrees F (82 degrees C).
      - 3) 160 psi (1103.2 kPa) at 73.4 degrees F (23 degrees C).
    - f. Material: Fittings to be made of Engineered Polymer and compliant with ASSE 1061 or CSA B137.5.
  8. Compatible with PEX pipe only.
  9. Approved for underground and behind-the-wall applications with no access panels.
  10. Warranty: 25 year when used with SharkBite PEX pipe.
  11. Fitting Types:
    - a. EvoPex Couplings: PEX-only push fitting used to permanently connect two pieces of PEX pipe together.
      - 1) K008WP3: 1/2 x 1/2 inch (12 x 12 mm).
      - 2) K016WP3: 3/4 x 3/4 inch (19 x 19 mm).
      - 3) K020WP2: 1 x 1 inch (25 x 25 mm).
    - b. EvoPEX Reducing Coupling: PEX-only push fitting used to permanently connect two different sizes of PEX pipe together.
      - 1) K058WP3: 3/4 x 1/2 inch (19 x 12 mm).
      - 2) K060WP2: 1 x 3/4 inch (25 x 19 mm).
    - c. EvoPEX 90 degree Elbow: PEX-only push fitting used to make a permanent 90 degree connection between two pieces of PEX pipe.
      - 1) K248WP6: 1/2 x 1/2 inch (12 x 12 mm).
      - 2) K256WP6: 3/4 x 3/4 inch (19 x 19 mm).
      - 3) K260WP2: 1 x 1 inch (25 x 25 mm).
    - d. EvoPEX Reducing Elbow: PEX-only push fitting used to make a permanent 90 degree connection between two different sizes of PEX pipe.
      - 1) K274WP3: 1/2 x 3/4 inch (12 x 19 mm).
      - 2) K277WP2: 1 x 1/2 inch (25 x 12 mm).
    - e. EvoPEX Male Elbow: PEX-only push fitting used to make a permanent 90 degree connection between PEX pipe and an FNPT thread.
      - 1) K280WP2: 1/2 x 1/2 inch (12 x 12 mm) MNPT.
    - f. EvoPEX Drop-Ear Elbow: PEX-only push fitting used to make a permanent 90 degree connection and transition from PEX pipe to a threaded pipe. Ideal for installing shower arms and tub spouts.
      - 1) K334WP3: 1/2 x 1/2 inch (12 x 12 mm) FNPT Drop Ear.
      - 2) K340WP2: 3/4 x 3/4 inch (19 x 19 mm) FNPT Drop Ear.
    - g. EvoPEX Cap: PEX-only push fitting used to cap the end of PEX tubing.
      - 1) K514TWP6: 1/2 inch (12 mm).
      - 2) K518WP6: 3/4 inch (19 mm).
      - 3) K520WP2: 1 inch (25 mm).
    - h. EvoPEX Female Elbow: PEX-only push fitting used to make a permanent 90 degree connection between PEX pipe and an MNPT thread.
      - 1) K308WP2: 1/2 x 1/2 inch (12 x 12 mm) FNPT.
    - i. EvoPEX Female Adapter: PEX-only push fitting used to permanently transition between PEX pipe and an MNPT thread.

- 1) K072WP3: 1/2 x 1/2 inch (12 x 12 mm) FNPT Straight.
- 2) K088WP3: 3/4 x 3/4 inch (19 x 19 mm) FNPT Straight.
- 3) K094WP2: 1 x 1 inch (25 x 25 mm) FNPT Straight.
- j. EvoPEX Male Adapter: PEX-only push fitting used to permanently transition between PEX pipe and an FNPT thread.
  - 1) K120WP3: 1/2 x 1/2 inch (12 x 12 mm) MNPT Straight.
  - 2) K134WP3: 3/4 x 3/4 inch (19 x 19 mm) MNPT Straight.
  - 3) K140WP2: 1 x 1 inch (25 x 25 mm) MNPT Straight.
- k. EvoPEX Ball Valve: PEX-only push-to-connect ball valve used to shut-off water flow for servicing and making repairs. This PEX ball valve requires no special tools, allowing for faster installation.
  - 1) K22222: 1/2 x 1/2 inch (12 x 12 mm).
  - 2) K22185: 3/4 x 3/4 inch (19 x 19 mm).
  - 3) K22223: 1 x 1 inch (25 x 25 mm).
- l. EvoPEX Tee: PEX-only push fitting used to permanently connect same-sized PEX pipe together.
  - 1) K362WP3: 1/2 x 1/2 x 1/2 inch (12 x 12 x 12 mm).
  - 2) K370WP3: 3/4 x 3/4 x 3/4 inch (19 x 19 x 19 mm).
  - 3) K374WP2: 1 x 1 x 1 inch (25 x 25 x 25 mm).
- m. EvoPEX Reducing Tee: PEX-only push fitting used to permanently connect different-sized PEX pipe together.
  - 1) K408WP3: 1/2 x 1/2 x 3/4 inch (12 x 12 x 19 mm). Reducing.
  - 2) K412WP3: 3/4 x 3/4 x 1/2 inch (19 x 19 x 12 mm). Reducing.
  - 3) K413WP2: 3/4 x 3/4 x 1 inch (19 x 19 x 25 mm). Reducing.
  - 4) K414WP2: 1 x 3/4 x 3/4 inch (25 x 19 x 19 mm). Reducing.
  - 5) K415WP2: 1 x 1 x 1/2 inch (25 x 25 x 12 mm). Reducing.
  - 6) K416WP2: 1 x 1 x 3/4 inch (25 x 25 x 19 mm). Reducing.
  - 7) K418WP2: 1 x 3/4 x 1 inch (25 x 19 x 25 mm). Reducing.
- n. EvoPEX Reducing Street Tee: PEX-only push fitting used to permanently connect different-sized PEX pipe together.
  - 1) K4483WP3: 3/4 x 3/4 x 1/2 inch (19 x 19 x 12 mm).
  - 2) K4485WP2: 1 x 1 x 1/2 inch (25 x 25 x 12 mm).
- o. EvoPEX Angle Stop: PEX-only supply stop used where the water pipe enters the room to control the flow of water to household plumbing fixtures and appliances. Ideal for maintenance and repair without having to shut-off water to the entire home.
  - 1) K23036: 1/2 x 3/8 inch (12 x 9 mm). Compression.
- p. EvoPEX Straight Stop: PEX-only supply stop used where the water pipe enters the room to control the flow of water to household plumbing fixtures and appliances. Ideal for maintenance and repair without having to shut-off water to the entire home.
  - 1) K23037: 1/2 x 3/8 inch (12 x 9 mm). Compression.
- q. EvoPEX Stub-Out: PEX Stub-Out used during the rough-in plumbing phase for pressure testing. The bullets allow stop valves to be installed during the trim-out phase.
  - 1) K24649WP: 1/2 x 6 inch (12 x 152 mm). w/ Bracket.
  - 2) K24650WP: 1/2 x 6 inch (12 x 152 mm).
  - 3) K25578WP12: 1/2 x 6 inch (12 x 152 mm). w/ Bracket and EvoPEX 90 degree Elbow.
  - 4) K25581WP12: 1/2 x 6 inch (12 x 152 mm). w/ EvoPEX 90 degree Elbow.
  - 5) K25721WP12: 1/2 x 10 inch (12 x 152 mm). w/ Bracket and EvoPEX 90 degree Elbow.
  - 6) K25721WP: 1/2 x 10 inch (12 x 254 mm). w/ Bracket.
  - 7) K25722WP12: 1/2 x 10 inch (12 x 254 mm). w/ EvoPEX 90 degree Elbow.
- r. EvoPEX Copper Stub-Out: Copper Stub-Out used during the rough-in plumbing phase for pressure testing. The bullets allow stop valves to be installed during the trim-out phase.
  - 1) K25811WP: 1/2 x 6 inch (12 x 152 mm). with Bracket and EvoPEX Elbow.
  - 2) K25813WP: 1/2 x 6 inch (12 x 152 mm). with EvoPEX Elbow.
  - 3) K25815WP: 1/2 x 8 inch (12 x 152 mm). with Bracket and EvoPEX Elbow.
  - 4) K25817WP: 1/2 x 8 inch (12 x 152 mm). with EvoPEX Elbow.

### 7.3 VALVES

- A. PEX-to-PEX, Lead Free (LF) Brass Ball Valves (1/2 inch through 2 inch nominal pipe size)
  1. Manufacturers: Provide ball valve(s) from the same manufacturer as the piping system.
  2. Full-port ball valve: two-piece, ASTM F1960 cold-expansion ends, with PEX-a reinforcing cold-

- expansion ring.
- 3. LF brass valve with a positive stop shoulder manufactured from C69300 brass.
- 4. In compliance with: 250 CWP, ANSI/NSF 359, ANSI/NSF 14/61, cNSF-us-pw\_G lead free 0.25% Lead max., ASTM F1960, ASTM F 877.

## 7.4 EXAMINATION

- A. Site Verification of Conditions: Verify that site conditions are acceptable for installation of the domestic water piping. Do not proceed with installation until unacceptable conditions are corrected.

## 7.5 INSTALLATION

- A. Install plumbing system according to approved shop drawings and coordination drawings.
- B. Comply with manufacturer's product data, including product technical bulletins, installation instructions and design drawings, including the following.
- C. Piping Installation:
  - 1. Install PEX-a Pipe Support, expansion loops, arms and offsets in compliance with Chapter 5 - "System Design and Layout" in the Uponor Plumbing Design Assistance Manual (PDAM).
  - 2. PEX shall not be installed in areas within five feet of UV light.
  - 3. Install piping in compliance with manufacturer's Plumbing Installation Guide.
- D. Hangers and Supports:
  - 1. Horizontal PEX-a Piping Hangers: Install CTS hangers suitable for PEX-a piping in compliance with Chapter 6 - "Installation Methods" and local codes, with the following maximum spacing:
    - a. 3 inch and below: Maximum span, 32 inches.
    - b. 1-1/4 inch and above: Maximum span, 48 inches.
  - 2. Vertical PEX-a Piping: Support PEX-a piping with minimum spacing of 5 feet.
  - 3. Horizontal PEX-a Piping with PEX-a Pipe Channel: Install hangers for PEX-a piping with horizontal support channel in accordance with local jurisdiction and manufacturer's recommendations, with the following maximum spacing:
    - a. 3/4 inch and below: Maximum span, 6 feet.
    - b. 1 inch and above: Maximum span, 8 feet.
  - 4. PEX-a Riser Supports: Install CTS riser clamps at the base of each floor and at the top of every other floor for domestic hot-water systems. Install mid-story guides between each floor. Install CTS riser clamps at the base of each floor and at the top of every fourth floor for domestic cold-water systems. Install mid-story guides.
- E. Piping Schedule:
  - 1. Underground / under-building slab, domestic water piping (3 inch and below) shall be the following:
    - a. 1/2 inch through 2 inch - PEX-a piping with engineered polymer (EP) or lead-free brass F1960 cold-expansion fittings. Insulate in compliance with Section - 9 "Plumbing Piping Insulation." Use the fewest possible joints and install per manufacturer's recommendations.
    - b. 3 inch - PEX-a piping with lead-free brass compression fittings complying with ASTM F 877. Insulate in compliance with Section "Plumbing Piping Insulation." Use the fewest possible joints and install per manufacturer's recommendations.
    - c. 1/2 inch through 2 inch - Pre-insulated PEX-a piping with PEX-foam insulation with engineered polymer (EP) or lead-free brass ASTM F 1960 cold-expansion fittings. Use the fewest possible joints and install per manufacturer's recommendations.
    - d. 3/4 inch through 2 inch - Pre-insulated PEX-a piping with multi-layer, closed-closed cell PEX-foam insulation and a corrugated HDPE jacket with engineered polymer (EP) or lead-free brass ASTM F 1960 cold- expansion fittings. Use the fewest possible joints and install per manufacturer's recommendations.
  - 2. In-slab, domestic water piping (2 inch and below) shall be the following: Bare PEX-a piping, pre-sleeved PEX-a piping, or pre-insulated PEX-a piping with engineered polymer (EP) or lead-free brass F1960 cold-expansion fittings. Use the fewest possible joints and install per manufacturer's recommendations.

3. Aboveground domestic water piping ( 3 inch and below) shall be the following: PEX-a piping, with engineered polymer (EP) or lead-free brass F1960 cold-expansion fittings, or lead-free brass compression fittings complying with ASTM F 877.

- F. Pipe Joint Construction: PEX-a Connections: Install per manufacturer's recommendations. Use manufacturer-recommended cold-expansion tool for ASTM F 1960 connections.
- G. Field Quality Control: Do not expose PEX piping to direct sunlight for more than 30 days. If construction delays are encountered, provide cover to portions of piping exposed to direct sunlight.

#### 7.6 BASIC VALVES:

- A. Provide valves complying with Division-15 Basic Mechanical Materials and Methods sections, in accordance with the following listing:
  1. Sectional Valves:
    - a. 2 inches and Smaller: Gate valves or ball valves
  2. Shutoff Valves:
    - a. 2 inches and Smaller: Gate valves or ball valves
  3. Drain Valves:
    - a. 2 inches and Smaller: Gate valves or ball valves
  4. Check Valves:
    - a. All Sizes: Swing check valves.
  5. Balance Valves:
    - a. All sizes: Bell and Gossett Circuit Setters.

#### 7.7 HOSE BIBBS:

- A. Where located on interior walls: "Woodford" Model 24 with polished bronze body, chrome plated, renewable composition disc, tee key handle, 3/4-inch inlet and hose outlet with non- removable vacuum breaker. Provide 2-1/2 gpm flow restrictor.
- B. Where located on exterior walls: "Woodford" Model 25 with rough brass body, renewable composition disc, tee key handle, 3/4-inch inlet and hose outlet with non removable non-freeze vacuum breaker.

#### 7.8 BACKFLOW PREVENTERS:

- A. Provide reduced-pressure principle backflow preventers consisting of assembly, including shutoff valves on inlet and outlet, and strainer on inlet, equal to Febco 825Y or 835YD, as required. Backflow preventers shall include test cocks, and pressure- differential relief valve located between two positive seating check valves. Construct in accordance with ASSE Standard 1013.
  1. Provide substantial padlock and chain to lock valves in open position, and turn key over to Project Inspector. Provide capped connections at each test cock.
  2. Provide two concrete filled, 6 inch diameter pipe ballard to protect all exposed piping from motor vehicle damage.
- B. Manufacturer: Subject to compliance with requirements, provide backflow preventers of one of the following:  
Febco Sales, Inc.; Subs. of Charles M. Bailey Company, Inc.  
Hersey Products, Inc. Watts Regulator Company

#### 7.9 WATER HAMMER ARESTORS:

- A. Provide water branch lines at single fixtures with a manufactured water hammer arrestor. Water hammer arrestors shall be sized per Plumbing Drainage Institute Standard PDI-WH201 "Water Hammer Arrestors."
  1. Where multiple fixtures are located in a row or battery a single or multiple water hammer arrestors, as required, may be used. Multiple fixture installations shall have the arrestor sized and located per standard PDI-WH201 and the manufacturer's installation instructions.
- B. All water hammer arrestors shall have male pipe thread connections.

- C. Manufacturer: Subject to compliance with requirements, provide water hammer arrestors of one of the following:  
Sioux Chief Manufacturing Co., "Hydra-Rester" Precision  
Plumbing Products, Inc.

### PART 3 EXECUTION

#### 3.1 INSPECTION:

- A. Examine areas and conditions under which plumbing piping systems are to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected in manner acceptable to Contractor.

#### 3.2 INSTALLATION OF WATER PIPING:

- A. Run all water piping generally level, free of traps or unnecessary bends, arranged to conform to the building requirements, and to suit clearance for other mechanical work such as ducts, flues, conduits, and other work. No piping shall be installed so as to cause unusual noise from the flow of water therein under normal conditions.
- B. Provide water branch lines at single fixtures with a manufactured water hammer arrestor.
1. Water hammer arrestors shall be located as close to the fixture as possible and in conjunction with the manufacturer's installation instructions.
  2. Where multiple fixtures are located in a row or battery a single or multiple water hammer arrestors, as required, may be used.
  3. Multiple fixture installations shall have the arrestor sized and located per standard PDI- WH201 and the manufacturer's installation instructions.
- C. Check final location of rubber rings within couplings on PVC water piping with gauge or as recommended by manufacturer. Make connection to valves with cast iron adapters connected to water pipe with cast iron couplings. Furnish and install anchors or thrust blocks.

#### 3.3 INSTALLATION OF VALVES:

- A. Install valves as indicated on Drawings and in the following locations:
1. Shutoff Valves: Install on inlet of each plumbing equipment item, and on inlet of each plumbing fixture, and elsewhere as indicated.
  2. Drain Valves: Install on each plumbing equipment item located to completely drain equipment for service or repair. Install at base of each riser, at base of each rise or drop in piping system, and elsewhere indicated or required to completely drain potable water system.

#### 3.4 INSTALLATION OF BACKFLOW PREVENTERS:

- A. Install backflow preventers where indicated on Drawings. Where drain pans are shown on the Drawings, pipe drain pan outlet to nearest floor drain.

#### 3.5 EQUIPMENT CONNECTIONS:

- A. Piping Runouts to Fixtures: Provide cold water piping runouts to fixtures of sizes indicated.

#### 3.6 SPARE PARTS:

- A. Furnish to Owner, with receipt, one valve key for each key operated hydrant, bibb, or faucet installed.

#### 3.7 DOMESTIC WATER SYSTEM STERILIZATION:

- A. Close open ends of water piping each day to prevent contamination or foreign matter entering pipe during construction. Thoroughly flush out piping to remove any dirt or foreign matter.
- B. After flushing of pipe systems, sterilize entire water systems from new point or points of connection before being turned over to Owner for use. Slowly fill system with water and add chlorine chemical agent to produce a minimum of 50 PPM of chlorine in entering water.
- C. Retain treated water in pipe for a minimum of twenty-four hours. Should chlorine residual at pipe extremities be less than 50 PPM at this time, pipe shall be re-chlorinated. As an option, the water systems may be filled with a water-chlorine solution containing a minimum of 200 PPM of chlorine and allowed to

stand for three hours.

- D. After chlorination, flush lines of chlorinated water and refill from domestic supply. Continue flushing until residual chlorine is not greater than the chlorine residual in the flushing water at all pipe extremities. The procedure shall be repeated if it is shown by bacteriological examination made by an approved testing agency that contamination persists in the system.

END OF SECTION

SECTION 22 13 19  
SANITARY WASTE PIPING SPECIALTIES

PART 8 GENERAL

8.1 SECTION INCLUDES

- A. Backwater valves; horizontal and vertical.

- B. Cleanouts; floor and wall.
- C. Fabricated stainless steel drains.
- D. Floor and area drains.
- E. Other floor and area drains.
- F. Trap Seal Primers; electronic, gravity flow, MI-GARD, regular.

## 8.2 RELATED SECTIONS

- A. Section 22 05 00 - Common Work Results for Plumbing.
- B. Section 22 10 00 - Plumbing Piping.

## 8.3 SUBMITTALS

- A. Submit under provisions of Section 01 30 00.
- B. Product Data:
  - 1. Manufacturer's data sheets on each product to be used.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Typical installation methods.
- C. Verification Samples: Two representative units of each type, size, pattern, and color.
- D. Shop Drawings: Include details of materials, construction, and finish. Include relationship with adjacent construction.

## 8.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.
- C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

## 8.5 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.
- B. Protect from damage due to weather, excessive temperature, and construction operations.

## 8.6 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

## 8.7 WARRANTY

- A. Manufacturer's standard limited warranty unless indicated otherwise.

# PART 9 PRODUCTS

## 9.1 MANUFACTURERS

- A. Acceptable Manufacturer: MIFAB, Inc., which is located at: 1321 W. 119th St.; Chicago, IL 60643; Toll Free Tel:

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

## 9.2 BACKWATER VALVES

### A. Horizontal Backwater Valves:

1. Product: BV1000 Backwater Valve with PVC Flapper: For use in main branch or sewer lines. Prevent backflow from sewers.
  - a. Lacquered cast iron backwater valve with no hub inlet and outlet, gasketed bolted cover, and automatic PVC flapper type backwater valve. Gravity flow only. Full opening access through cover to the flapper assembly for repair and maintenance. Pipe Sizes: 2, 3, 4, 6, 8, 10, and 12 inch.
2. Product: BV1200-R Backwater Valve with PVC Flapper and Nickel Bronze Access Cover: For use in main branch or sewer lines. Prevent backflow from sewers.
  - a. Lacquered cast iron backwater valve with no hub inlet and outlet, gasketed bolted cover, automatic PVC flapper type backwater valve. Full opening access through cover to flapper assembly for repair and maintenance. Lacquered cast iron extension to receive pipe extension (by others) and nickel bronze scoriated access cover and provides means with an extension pipe (by others) to raise access cover to whatever height is required. Pipe Sizes: 2, 3, 4, and 6 inch.
3. Product: BV1210 Angle Pit Drain with Backwater Valve: To prevent backflow back into the drain line. For use in base of side walls in pits where a low installation location requires a top inlet grate and horizontal outlet.
  - a. Lacquered cast iron angle pit drain with removable backwater valve and seat. Pipe Sizes: 2, 3, 4, and 6 inch.
4. Product: BV1300 In-Line Manually Operated Gate Type Backwater Valve: For use as a drainage control valve. Provides protection against sewage backflow.
  - a. Lacquered cast iron body with automatic PVC flapper valve and bronze gate valve manually controlled by recessed handle underneath floor cover connected to a bronze non-rising threaded control rod. Manually closed gate provides additional protection during severe storms or when the building is not in use. Pipe Sizes: 4 and 6 inch.

### B. Vertical Backwater Valves:

1. Product: BV1250 Backwater Valve with Neoprene Seat: For use inside the no hub outlet connections of various drain bodies or inside of various floor drain strainers. To prevent backflow of water from the plumbing line up through the strainer.
  - a. Pipe Size: 4 inches.
2. Product: BV1260 Vertical Cast Iron Backwater Valve with Neoprene Seat: For use in piping system directly under various floor drain bodies to prevent backflow of water from plumbing line up through strainer.
  - a. Lacquered vertical cast iron backwater valve with neoprene rubber seat.
  - b. Pipe Sizes: 2, 3, and 4, inch.

## 9.3 CLEANOUTS

### A. Floor Access Cover Cleanouts:

1. Product: C1300 Scoriated Access Floor Covers: For finished floors. Emergency access to plumbing for removal of blockages.
  - a. Round: 7 or 9 inches. Square: 6 or 9 inches. Frame, anchor lugs, and vandal resistant stainless steel allen key screws. Nickel bronze or ductile iron. Scoriated cover provides a non-skid surface. Anchor tabs provide a means to secure frame to sub floor.
2. Product: C1300-MF Heavy Duty Access Housing with Anchor Flange: For use inside and outside buildings.
  - a. Flanges are anchored in concrete to keep housing rigid and free of piping, so no loading is transmitted to plumbing or electrical connections. Lacquered cast iron heavy duty access housing with fixed anchor flanges, ductile iron access cover with 6-1/2 inch clear bottom access.
3. Product: C1300-UR/US Floor Access Cover Recessed for Terrazzo: 9 inch round, 8 inch square. For finished floors. Emergency access to plumbing for blockage removal.
  - a. Recessed cover provides area for floor tile to be installed. Anchor tabs provide a means to secure frame to the sub floor. Nickel bronze with nickel bronze frame, anchor lugs, and vandal resistant



stainless steel screws.

4. Product: C1310 Floor Access Cover: For use in finished floors. Emergency access to plumbing for blockage removal.
  - a. Nickel bronze body with round, scoriated secured cover. Pipe Sizes: 2, 3, 4, and 6 inch.

B. Wall Access Cover Cleanouts:

1. Product: C1400-R/S Smooth Wall Access Cover: For use in walls. Emergency access to plumbing for blockage removal.
  - a. Round: 6 or 9 inches. Square: 7, 9, or 12 inches. Nickel bronze or stainless steel frame, with anchor lugs and vandal resistant stainless steel allen key screws. Anchor tabs provide a means to secure from the wall structure.
2. Product: C1400-RD Stainless Steel Round Cover with Screw: For use in walls. Emergency access to plumbing for blockage removal.
  - a. Smooth stainless steel access cover and 3-1/2 inch long anchor screw. Pipe Sizes: 3, 4, 5, 6, 8, and 10 inch.
3. Product: C1430 Recessed Head Bronze Line Cleanout Plug: For use in drainage pipe where a cleanout is required.
  - a. Cast bronze recessed head bronze line cleanout plug with blind tapping. Recessed head has square sized slot to receive tool for removal. Tapping in plug can receive bolt from wall cleanout plate. Pipe Sizes: 2, 3, 4, 5, 6, and 8 inch.
4. Product: C1430-RD Round Stainless Steel Smooth Access Cover with Bronze Cleanout Plug and Screw: For use in walls. Emergency access to plumbing for blockage removal.
  - a. Cast bronze cleanout plug with round, smooth, stainless steel access cover and 3-1/2 inch long anchor screw. Bronze plug provides access point to stack. Pipe Sizes: 2, 3, 4, 5, 6, and 8 inch.
5. Product: C1440 Expandable Line Cleanout: For use in drainage pipe where a cleanout is required. Plug expands into pipe opening as tightened.
  - a. Tapping in plug can receive bolt from wall cleanout plate. Pipe Sizes: 1-1/2, 2, 3, and 4 inch.
6. Product: C1440-R Expandable Line Cleanout with Nickel Bronze Wall Access Panel: Installed flush into walls during wall construction to cover and access cleanout plugs installed in drainage pipe. Plug will expand into pipe opening as tightened. Tapping in plug can receive bolt from wall cleanout plate.
  - a. Expandable line cleanout plug with tapping and 7 inch round, smooth nickel bronze access panel with allen key screws and anchor frame with mounting lugs. Pipe Sizes: 1-1/2, 2, 3, and 4 inch.
7. Product: C1440-RD Expandable Line Cleanout with Smooth Round Access Cover: Installed on opening in wall or ceiling. Emergency access to plumbing for blockage removal.
  - a. Plug will expand into pipe opening as tightened. Tapping in plug can receive bolt from wall cleanout plate. 3-1/2 inch long anchor screw. Pipe Sizes: 1-1/2, 2, 3, and 4 inch.
8. Product: C1440-S Expandable Line Cleanout with Square Access Panel: Installed flush into walls during construction. Covers access to cleanout plugs installed in drainage pipe.
  - a. Plug will expand into pipe opening as tightened. Tapping in plug can receive bolt from wall cleanout plate. 7 inch square, smooth nickel bronze access panel with allen key screws and anchor frame with mounting lugs. Pipe Sizes: 1-1/2, 2, 3, and 4 inch.
9. Product: C1450 Line Cleanout Plug with Blind Tapping: For use in drainage pipe where a cleanout is required.
  - a. Plug will fit into pipe opening. Available in cast iron, PVC, ABS, or nickel bronze to suit the pipe material. Tapping in plug can receive bolt from cleanout plate. Pipe Sizes: 2, 3, and 4 inch.
10. Product: C1450-R Line Cleanout with Round, Nickel Bronze Wall Access Panel: Installed flush into walls during construction to cover cleanout plugs installed in drainage pipe.
  - a. Drain line cleanout plug with blind tapping and smooth nickel bronze access panel with allen key screws and anchor frame with mounting lugs. Round 6 inch access panel eliminates need to align with adjacent floor and ceiling patterns. Anchor tabs to secure cover to wall structure. Pipe Sizes: 2, 3, and 4 inch.
11. Product: C1450-RD Line Cleanout with Round, Stainless Steel Smooth Access Cover: Installed on an opening in the finished wall or ceiling. Emergency access to plumbing for blockage removal.
  - a. Drain line cleanout plug with blind tapping and 6 inch round, smooth stainless steel access cover with 3-1/2 inch anchor screw. Plug will fit into pipe opening and is available in cast iron, PVC, ABS, or nickel bronze material to suit pipe material. Tapping in plug can receive bolt from wall cleanout plate. Pipe Sizes: 2, 3, and 4 inch.
12. Product: C1450-S Line Cleanout with Square Wall Access Panel: Installed flush into walls during wall construction to cover and access cleanout plugs installed in drainage pipe.

- a. Drain line cleanout plug with blind tapping and 7 inch square, smooth nickel bronze access panel with allen key screws and anchor frame with mounting lugs. Anchor tabs provide a means to secure cover to wall structure. Pipe Sizes: 2, 3, and 4 inch.
- C. Non-Adjustable Finished Floor Cleanouts:
  - 1. Product: C1230 Line or Floor Cleanout: For use in finished floors. Emergency access to plumbing for blockage removal. Non-adjustable top.
    - a. Lacquered cast iron cleanout ferrule with 1/2 inch thick gasketed combined ductile iron cover and plug. Pipe Sizes: 2, 3, 4, 6, and 8 inch.
  - 2. Product: C1230-WF Floor Cleanout for Wood Floor Installations: For use in finished wood floors. Emergency access to plumbing for blockage removal. Non-adjustable top.
    - a. Lacquered cast iron wood floor cleanout. 1-1/2 inch wide anchor flange and combined gasketed access cover and plug. Pipe Sizes: 2, 3, and 4 inch.
  - 3. Product: C1500 Deck Cleanout: For use in finish floors. Emergency access to plumbing for blockage removal blockages.
    - a. Nickel bronze body with round, scoriated secured cover. Pipe Sizes: 3, 4, 6, and 12 inch.
- D. Round Finished Floor Cleanouts:
  - 1. Product: C1000-R Stainless Steel Floor Cleanout with Heavy Adjustable Cover and Plug: For use in finished floors. Emergency access to plumbing for blockage removal.
    - a. Lacquered cast iron body and anchor flange. Heavy duty, cast, Type 304 stainless steel cover and plug. Secondary "O" ring test seal, 4 inch diameter cleanout opening, and heavy duty cast stainless steel scoriated combined cover and plug top assembly with vandal proof allen key screws and primary gasket seal. Membrane clamp for membrane floors. Placement of surface level cover/plug with neoprene gasket glued to underside provides visual evidence the cleanout has been properly sealed to prevent sewer gases from entering building. Pipe Sizes: 2, 3, 4, 5, and 6 inch.
  - 2. Product: C1100-XR Floor Cleanout with Heavy Duty Round Adjustable Cover and Plug: For unfinished floors with heavy load traffic; warehouses, manufacturing facilities. Emergency access to plumbing for blockage removal.
    - a. Lacquered cast iron body and anchor flange. Secondary "O" ring test seal, 4 inch diameter cleanout and round heavy duty square scoriated combined cover and plug top assembly with stainless steel vandal proof allen key screws and primary gasket seal. Membrane clamp for membrane floors.
    - b. For unfinished floors with heavy load traffic; warehouses, manufacturing facilities. Emergency access to plumbing for blockage removal. Placement of surface level cover/plug with neoprene gasket glued to underside provides visual evidence the cleanout has been properly sealed to prevent sewer gases from entering building. Pipe Sizes: 2, 3, 4, 5, and 6 inch.
- E. Square Finished Floor Cleanouts:
  - 1. Product: C1100-S Floor Cleanout with Adjustable Cover and Plug: Used in finished floors. Emergency access to plumbing for blockage removal.
    - a. Lacquered cast iron body and anchor flange, secondary "O" ring test Seal, 4 inch diameter cleanout and square scoriated combined cover and plug top assembly with stainless steel vandal proof allen key screws and primary gasket seal. Membrane clamp for membrane floors. Placement of surface level cover/plug with neoprene gasket glued to underside provides visual evidence the cleanout has been properly sealed to prevent sewer gases from entering building. Pipe Sizes: 2, 3, 4, 5, and 6 inch.
  - 2. Product: C1100-TS Floor Cleanout for Tile Areas with Adjustable Cover and Plug: Used in finished floors. Emergency access to plumbing for blockage removal. Typical in floors where a minimum amount of cleanout top is desired to be visible. The recess in the cover is to receive vinyl or thin floor tile.
    - a. Lacquered cast iron body and anchor flange, secondary "O" ring Test Seal, 4 inch diameter cleanout opening and square scoriated combined cover and plug top assembly. 1/8 inch recess for tile and stainless steel vandal proof allen key screws and primary gasket seal. Membrane clamp for membrane floors. Placement of surface level cover/plug with neoprene gasket glued to underside provides visual evidence the cleanout has been properly sealed to prevent sewer gases from entering building. Pipe Sizes: 2, 3, 4, 5, and 6 inch.
  - 3. Product: C1100-XS Floor Cleanout with Heavy Duty Adjustable Cover and Plug: Used in finished floors. Emergency access to plumbing for blockage removal.

- a. Lacquered cast iron body and anchor flange, secondary "O" ring Test Seal, 4 inch diameter cleanout opening and heavy duty square scoriated combined cover and plug top assembly with stainless steel vandal proof allen key screws and primary gasket seal. Membrane clamp for membrane floors. Placement of surface level cover/plug with neoprene gasket glued to underside provides visual evidence the cleanout has been properly sealed to prevent sewer gases from entering building. Pipe Sizes: 2, 3, 4, 5, and 6 inch.
4. Product P7060-S. 6 inch Square, Type 316 Stainless Steel Fabricated Industrial Floor Cleanout: 12 gauge Type 316 stainless steel, sanitary floor cleanout with special duty load rated gasketed 1/2 inch thick cover. Bead blasted finish. PVC secondary plug and Cleanout. Outlet: 3 or 4 inch no hub.
  - a. Meets U.S. FDA Standards for corrosion resistance.
5. Product P7080-S. 8 inch Square, Type 316 Stainless Steel Fabricated Industrial Floor Cleanout: 12 gauge Type 316 stainless steel, sanitary floor cleanout with special duty load rated gasketed 1/2 inch thick cover. Bead blasted finish. PVC secondary plug and Cleanout. Outlet: 3, 4, or 6 inch no hub.

#### 9.4 FLOOR AND AREA DRAINS

##### A. Integral Deep Seal Traps - Finished Floor Area Drains:

1. Product: F1120T-C Floor Drain: Used in showers, kitchens, restrooms, and non-membrane finished areas where side outlet body with integral deep seal trap is required. For all types of poured finished floors.
  - a. Lacquered cast iron body with anchor flange, integral deep seal trap, and standard reinforced strainer, Pipe Sizes: 2, 3, and 4 inches. Strainer Diameter: 5, 6, 7, 8, and 10 inches.
2. Product: F1100 Floor Drain: Used in showers, kitchens, restrooms, and other non-membrane finished areas. Round adjustable nickel bronze strainer is used for all types of poured finished floors.
  - a. Lacquered cast iron floor drain with anchor flange, and standard satin finished nickel bronze strainer with vandal resistant stainless steel allen key screws.
  - b. Pipe Sizes: 2, 3, 4, 5, and 6 inches. Strainer Sizes: 5, 6, 7, 8, and 10 inch diameter.
3. Product: F1100-90 Floor Drain with Side Outlet for Non-Membrane Floor Areas: Used in showers, kitchens, restrooms, and non-membrane finished areas where shallow side outlet body connection is required. For all types of poured finished floors.
  - a. Lacquered cast iron floor drain with anchor flange, weepholes, threaded side outlet, and reinforced strainer.
  - b. Pipe Sizes: 2, 3, and 4 inches. Strainer Sizes: 5, 6, 7, 8, and 10 inch diameter.
4. Product: F1100-C Floor Drain: Used in showers, kitchens, restrooms, and other membrane finished areas. For all types of poured finished floors.
  - a. Lacquered cast iron floor drain, anchor flange, membrane clamp ring with primary and secondary weepholes for waterproofing membrane. Satin finished nickel bronze strainer with vandal resistant stainless steel all on key screws.
  - b. Pipe Sizes: 2, 3, 4, 5, and 6 inches. Strainer Sizes: 5, 6, 7, 8, and 10 inch diameter.
5. Product: F1100-C-N Floor Drain with Tractor Grate: Used in restaurants, hospitals, industrial laboratories, and membrane finished areas where heavy wheeled loads are expected and loose set, non-tilt tractor grate is needed. Clamp to secure waterproofing membrane.
  - a. Lacquered cast iron floor drain, anchor flange, cast iron clamp ring with primary and secondary weepholes for waterproofing membrane, 7 or 9 inch tractor grate. Pipe Sizes: 2, 3, 4, 5, and 6 inches. Strainer Size: 6 inch diameter.
6. Product: F1100-C-T Floor Drain with Spanner Wrench Cover: Used in non-membrane finished areas where irregular drain use is required. Solid, gas tight, spanner wrench, vandal proof, stainless steel cover ensures secure access. Used for all types of poured finished floors.
  - a. Lacquered cast iron floor drain, anchor flange, membrane clamp with primary and secondary weepholes for waterproofing membrane. Heavy duty, solid, gas tight, spanner wrench, vandal proof, stainless steel cover for secured access.
  - b. Pipe Sizes: 2, 3, 4, 5, and 6 inches. Strainer Sizes: 6 and 7 inch diameter.

#### 9.5 TRAP SEAL PRIMERS

1. Product: MR-ENC-AG Trap Seal Primer in a Box with Shut Off Valve, Air Gap, and Distribution Unit: Encloses an MR Series pressure drop activated trap seal primer within a wall for convenient inspection and maintenance.
  - a. Enclosure Box: 16 gauge powder epoxy coated steel. Stainless steel 16 gauge is available. Bottom of box slopes to front. Cover with cylinder key lock is optional.

- b. Mounting Brackets: 4.
    - c. Beeco low lead 1/2 inch ball valve.
    - d. MR-500-NPM Pressure drop activated trap seal primer.
    - e. All pipe penetrations sealed watertight by grommets.
    - f. Copper Pipe: 1/2 inch by others.
    - g. Distribution Unit: Serves up to 4 drains.
    - h. Brass Connection Connectors: 1/2 or 5/8 port connections,
  - 2. Product: MR-ENC-DU Trap Seal Primer in a Box with Shut Off Valve and Distribution Unit: Encloses an MR Series pressure drop activated trap seal primer within a wall for convenient inspection and maintenance.
    - a. Enclosure Box: 4 inches deep. 16 gauge powder epoxy coated steel. Stainless steel 16 gauge is available. Bottom of box slopes to front. Cover with cylinder key lock is optional.
    - b. Mounting Brackets: 4.
    - c. Beeco low lead 1/2 inch ball valve.
    - d. MR-500-NPB Pressure drop activated trap seal primer.
    - e. All pipe penetrations sealed watertight by grommets.
    - f. Copper Pipe: 1/2 inch by others.
    - g. Distribution Unit: Serves up to 4 drains.
    - h. Brass Connection Connectors: 1/2 or 5/8 port connections,
- B. Gravity Flow Trap Seal Primers:
- 1. Product: MI-700 Tailpiece Trap Seal Primer: Replace standard flush valve connection providing a freshwater discharge to replenish the floor drain trap seal. Three ounces of water will flow through the priming tube connection each time the flush valve operates.
    - a. Primes one floor drain trap no further than twenty feet from fixture.
    - b. Body: 17 gauge chrome plated cast brass body.
    - c. Make Up Water Line: 1/2 inch copper connecting trap seal primer to floor drain trap.
    - d. MI-750 Tailpiece Trap Seal Primer with Braided Connecting Hose: Used to collect condensate from air conditioning and refrigeration equipment. Condensate gravity drains through piping to tapped inlet on fixture side of the primer. Braided hose drains condensate from trap to line connected to trap seal primer tapping in floor drain bodies to maintain the trap seal.
      - 1) Body: Polished chrome plated cast brass body with bottom cleanout, gasketed ground joint elbow with 1-1/2 inch tailpiece, 1-1/2 inch slip nuts and washers, 1-1/4 inch slip nut and washer for 1-1/4 inch sink tail piece installation, escutcheons, braided hose primer tubing and compression fitting.

## PART 10 EXECUTION

### 10.1 EXAMINATION

- A. Do not begin installation until substrates have been properly constructed and prepared.
- B. If substrate preparation is the responsibility of another installer, notify Owners Representative in writing of unsatisfactory preparation before proceeding.

### 10.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 10.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

### 10.4 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.
- B. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.

### 10.5 CLEANING AND PROTECTION

- A. Clean products in accordance with the manufacturer's recommendations.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 22 40 00 - PLUMBING FIXTURES AND TRIM

PART 1 – GENERAL

1.1 CONDITIONS OF THE CONTRACT:

- A. The Conditions of the Contract (General, Supplementary, and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.

1.2 WORK INCLUDED:

- A. Types of plumbing fixtures required for the project include the following:
  - Water Closets Urinals
  - Lavatories Mop Sink Service
  - Sink

1.3 QUALITY ASSURANCE:

- A. Plumbing Fixture Standards: Comply with applicable portions of the following codes and requirements for all work in this section:
  - California Plumbing Code - CPC
  - American National Standards Institute - ANSI Federal Standards - F.S.
- B. All plumbing components within the waterways shall comply with the Safe Drinking Water Act (SDWA) "No-Lead" restrictions of ANSI/NSF Standard 61 Section 9.

1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical product data for plumbing fixtures and trim, including catalog cut of each fixture type and trim item furnished.

- B. Maintenance Data: Submit maintenance data and replacement material lists for each type of material listed in this section. Include this data and product data in maintenance manual.

#### 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING:

- A. Handle plumbing fixtures carefully to prevent breakage, chipping, and scoring the fixture finish. Do not install damaged plumbing fixtures; replace and return damaged units to equipment manufacturer.

### PART 2 - PRODUCTS

#### 2.1 GENERAL REQUIREMENTS FOR PLUMBING FIXTURES:

- A. All fixtures shall be first class in every respect. Accurately line up finished plumbing. Take special care with the roughing-in and finished plumbing where batteries of fixtures occur.
- B. Consult Architectural Drawings, as well as Plumbing Drawings, for locations, dimensions and mounting height of plumbing fixtures.
  - 1. Take location and mounting heights for roughing-in from Architectural Drawings
  - 2. Follow schedule on Plumbing Drawings for roughing-in connections. Set roughing-in for all fixtures exactly as per measurements furnished by the manufacturers of the fixtures used.
  - 3. Roughing-in for lavatories and sinks shall be brought in through the wall under the centerline of the drain from the fixture wherever possible and as close to the fixture as possible.
- C. Provide all water supplies to fixtures with compression shut-off stops with IPS inlets, threaded brass nipples at pipe connection, and a lock shield-loose key. Provide combination fixtures with compression stop on each water supply fitting. Provide loose key handle for each stop.
  - 1. Provide 1/2 inch rigid risers for all fixtures, unless otherwise noted.
- D. Furnish shut-off valves on hose bibbs directly connected to mains with no intervening valves.
- E. Except where otherwise specified, all finish for exposed metal trim on fixture shall be polished chromium plated. This also applies to wall flanges, nuts, and washers. Handles on all faucets and stops shall be all-metal chromium plated.
- F. Make connection between fixtures and flanges on soil pipe absolutely gastight and watertight with neoprene-type gaskets (wall-hung fixtures) or bowl wax (floor outlet fixtures). Rubber gaskets or putty will not be permitted.
- G. Provide fixtures not having integral traps with "P" traps of chromium-plated cast brass body without cleanout connected to concealed waste in wall and sanitary fittings. Provide fixtures with a 17-gauge minimum traps and tailpiece and grid drain unless otherwise noted.
- H. Unions on waste pipes on fixture side of traps may be slip or flange joints with soft rubber or lead gaskets.

#### 2.2 PLUMBING FIXTURE HANGERS AND SUPPORTS:

- A. Properly install and support plumbing fixtures as required and specified herein.
- B. Carriers and supports shall be J.R. Smith, Zurn, or equal types as recommended by manufacturer for the particular installation and type of fixture being installed.
  - 1. Residential-type fixture supports are not acceptable.
- C. Install wall-mounted water closets with combination support and waste fittings, with feet of support securely anchored to floor.
- D. Install the following fixtures on concealed support with feet of support securely anchored to floor. Anchor top of support to wall construction in an approved manner.
  - Wall mounted water closets
  - Wall mounted urinals
  - Wall mounted lavatories
- E. Install wall-hung lavatories with concealed arms and floor support, with feet of support securely anchored to floor. In addition, anchor top of support to wall construction in an approved manner.
- F. Provide fixtures, except water closets, which are installed against walls with concealed arms or brackets securely anchored to studs. Anchor arms or brackets to studs in a manner as directed by

Owners Representative.

## 2.3 PLUMBING FIXTURES:

- A. Fixtures shall be Willoughby Industries or approved equal.
- B. Plate numbers indicated are Willoughby Industries, complete as illustrated and described, unless otherwise noted. Provide stops for all concealed supplies.
- C. Water Closet (WC-1): Toilet shall be Willoughby Model No. ETW-1490-OF or approved equal. Fixture shall be fabricated from 14 gauge, type 304 stainless steel. The construction shall be all welded, with exposed stainless surfaces polished to a #4 satin finish. Standard toilet shall include: elongated toilet bowl with contoured seat, integral crevice-free self-draining flushing rim with positive after fill and fully enclosed 2 1/2" O.D. trap which shall maintain a minimum 2" seal and pass a 2 1/8" ball. Toilet shall be blowout type which requires 35 psi minimum flushing pressure. Model shall meet the requirements of ASME A112.19.3/CSA B45.4. Fixture shall withstand loadings of 5,000 lbs. without permanent damage. Anchoring shall be by standard 6-point system (4 in the wall and 2 in the floor): threaded rods, nuts and washers shall be furnished for walls up to 8" thick. Floor anchoring by others. Unit shall require chase area for installation and maintenance.
- D. Urinal (U-1): Wall Hung Front Access High Efficiency Ligature-resistant Urinal shall be Willoughby Model No. ASUW-1314-HEU-FA-BS or approved equal. Fixture is fabricated from all 16 gauge, type 304 stainless steel. The construction shall be all-welded with exposed stainless steel surfaces polished to a satin finish. Contoured interior and exterior surfaces for ease of cleaning. Standard equipment shall include: machined stainless steel flush nozzle, beehive strainer, removable 'P' trap with 1-1/2" FIP waste connection, 3/4" NPT male inlet connection and removable access cover. High Efficiency Urinal shall be washout type requiring 1/8 GPF to 1/2 GPF flush valve and 25 psi minimum flushing pressure. Trap shall be fully enclosed and maintain a 3" seal. Unit requires no chase area for installation and maintenance. Mounting hardware by others. Urinals mounted at 17" rim height to comply with ANSI, ADA and UFAS accessibility requirements. Please consult local code as compliance is subject to the interpretation and requirements of the local code authority.
- E. Lavatory (L-1): Lavatory shall be Willoughby Model No. HS-1013-46HC or approved equal. Fixture shall be fabricated from 14 gauge, type 304 stainless steel. The construction shall be all welded, with exposed stainless surfaces polished to a #4 satin finish. Standard lavatory shall include: oval-shaped bowl, 13" x 9 1/2" x 6" deep, stainless steel penal filler/bubbler, fast drain with air vent, elbow waste (1 1/2" F.I.P.) and self-draining soap dish. Cabinet interior shall be sound deadened with fire-resistant material. Anchoring shall be by standard 4-point system: threaded rods, nuts and washers shall be furnished for walls up to 8" thick. Unit shall require chase area for installation and maintenance.
- F. Sink (SS-1): Mop sink shall be Willoughby Model No. CWMS-242412 or approved equal. Entire fixture shall be fabricated from 16 gauge, type 304 stainless steel. The construction shall be all-welded, with exposed exterior stainless surfaces polished to a #4 satin finish. Standard equipment shall include: rectangular shaped sink 24"x24"x12", 3" caulk drain w/ removable strainer.

## PART 3 - EXECUTION

### 3.1 INSPECTION AND PREPARATION:

- A. Examine roughing-in work of domestic water and waste piping systems to verify actual locations of piping connections prior to installing fixtures. Also examine floors, substrates, and conditions under which fixture work is to be accomplished. Correct any incorrect locations of piping and other unsatisfactory conditions for installation of plumbing fixtures. Do not proceed with work until unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION:

- A. Install plumbing fixtures of types indicated where shown and at mounting height indicated on Architectural Drawings in accordance with fixture manufacturer's written instructions, roughing-in Drawings, and with recognized industry practices. Ensure that plumbing fixtures comply with requirements and serve intended purposes. Comply with applicable requirements of the Uniform Plumbing Code pertaining to installation of plumbing fixtures.
- B. In all cases where plumbing fixtures are mounted on or against building walls of concrete or other

materials having relatively rough or non-planar surfaces, it shall be the responsibility of this Contractor to provide any necessary grout or backing materials required to facilitate fixture mounting and eliminate void spaces between fixtures and wall to ensure adequate bearing contact.

1. On completion of installation, provide silicone sealer at all points of fixture contact with walls or floors.

C. Any fixture broken, cracked, or otherwise damaged during installation must be replaced by Contractor at his own expense.

### 3.3 TRAPPING AND VENTING OF FIXTURES:

A. Trap and vent all plumbing fixtures in accordance with Michigan Plumbing Code, whether or not shown on Drawings. Strictly adhere to any local codes. Only exceptions to above will be those fixtures which are specially noted herein or on Drawings to be provided with special wastes.

B. No vent shall intersect another vent at a point less than 6 inches above extreme overflow level of highest fixture served.

C. Take vents off top half of horizontal runs and grade so as to free vents quickly of any water or condensation.

### 3.4 ADJUSTMENT OF PLUMBING PIPING SYSTEM:

A. Test and adjust all flush valves so that each fixture receives the proper amount of water. Regulate all faucets, bibbs, drinking fountains, etc. to the approval of the Owners Representative so that the entire system is left in first-class condition.

B. Clean fixtures, equipment, and materials installed under this contract. Remove cement, plaster, paint and/or rust, etc. Dirt, rubbish, paint spots, or grease on walls or fixtures for which this Contractor is responsible must be removed by him.

### 3.5 CLEAN AND PROTECT:

A. Clean plumbing fixtures of dirt and debris upon completion of installation.

B. Protect installed fixtures from damage during the remainder of the construction period.

### 3.6 FIELD QUALITY CONTROL:

A. Upon completion of installation of plumbing fixtures and after units are water pressurized, test fixtures to demonstrate capability and compliance with requirements. When possible, correct malfunctioning units at site, then retest to demonstrate compliance; otherwise, remove and replace with new units and proceed with retesting.

B. Inspect each installed unit for damage to finish. If feasible, restore and match finish to original at site; otherwise, remove fixture and replace with new unit. Feasibility and match to be judged by Owners Representative. Remove cracked or dented units and replace with new units.

### 3.7 EXTRA STOCK:

A. Furnish special wrenches and other devices necessary for servicing plumbing fixtures and trim to Owner with receipt. Furnish one device for every 10 units.

### 3.8 OPERATION TEST:

A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

### 3.9 CLEANING UP:

A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION



## SECTION 23 31 00 - HVAC DUCTS AND CASINGS

### PART 1 – GENERAL

#### 1.1 CONDITIONS OF THE CONTRACT:

- A. The Conditions of the Contract (General, Supplementary, and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.
- B. This section is a Section 23 Basic Materials and Methods section and is a part of each Section 23 section making reference to mechanical insulation specified herein.

#### 1.2 WORK INCLUDED:

- A. Types of ductwork required for this project include the following: Sheet Metal Ductwork
- B. Construct all other ductwork for 2-inch w.g. pressure class, except as noted, per SMACNA requirements.

#### 1.3 QUALITY ASSURANCE:

- A. Installer: A firm with at least three years of successful installation experience on projects similar to that required for this work.
  - 1. For work on fiberglass ductwork provide statement from manufacturer indicating that the manufacturer accepts this fabricator to be a qualified fabricator.
- B. SMACNA Compliance: Comply with applicable portions of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) for all work in this section.
- C. ASHRAE Standards: Comply with American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) recommendations, latest edition, for all work in this section.
- D. NFPA Compliance: Comply with ANSI/NFPA 90A, "Standard for the Installation of Air-Conditioning and Ventilating Systems," and ANSI/NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems."

#### 1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's specifications on manufactured products and factory-fabricated ductwork, used for work of this section.
- B. Record Drawings: At project close-out, submit Record Drawings of installed ductwork, duct accessories, and outlets and inlets in accordance with requirements of Division 1.

## PART 2 - MATERIALS

### 2.1 GENERAL:

- A. Where ductwork is exposed to weather, the ductwork shall be cross-broken, to eliminate any possibility of standing water on the ducts.

### 2.2 SEALANTS:

- A. Duct sealant shall be water based fire resistive with a UL 181B listing, non-fibrated sealant for use on low, medium and high velocity ducts. Sealant VOC levels should also meet S.C.A.Q.M.D. Rule #1168 (LEED IEQ 4.1) classified as an architectural sealant and be mildew resistant as tested by ASTM G21 with 0 growth rating. Sealant shall be rated to 10 inches water gauge. Sealant to be installed in accordance with the manufacturer's instructions. Pressure-sensitive tapes are not acceptable.

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering factory-fabricated ductwork which may be incorporated in the work include the following:

<u>MANUFACTURER</u>	<u>PRODUCT</u>
Hardcast	Iron-Grip 601
Foster	32-19
Childers	CP-146

- B. Where seams are exposed to weather, ductwork shall be covered with fibrated water based duct sealant with a UL 181B-M listing, be UV inhibited, and incorporate fiber reinforcement.

- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering factory-fabricated ductwork which may be incorporated in the work include the following:

<u>MANUFACTURER</u>	<u>PRODUCT</u>
Hardcast	Versa-Grip 181
Foster	32-17
Childers	CP-148

### 2.3 TWO-INCH PRESSURE CLASS DUCTWORK MATERIALS:

- A. Sheet Metal Ductwork: Except as otherwise indicated, fabricate ductwork with commercial grade of galvanized steel.
- B. Round supply ductwork shall be of the same materials, gauges, and construction as that indicated for 4 inch pressure class ductwork.
- C. Ductwork Support Materials: Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim, and angles for support of ductwork.

### 2.4 TWO-INCH PRESSURE CLASS FABRICATION:

- A. Shop fabricate ductwork in 4-, 8-, 10- or 12-foot lengths, unless otherwise indicated or required, to complete runs. Pre-assemble work in shop to greatest extent possible, so as to minimize field assembly of systems. Disassemble systems only to extent necessary for shipping and handling. Match-mark sections for reassembly and coordinated installation.
- B. Shop fabricate ductwork of gauges and reinforcement complying with SMACNA HVAC Duct Construction Standards, latest edition.
- C. Fabricate ductwork with accessories installed during fabrication to the greatest extent possible. Refer to Division-15 section "DUCT ACCESSORIES" for accessory requirements.
- D. Fabricate duct fittings to match adjoining ducts and to comply with duct requirements as applicable to fittings. Except as otherwise indicated, fabricate elbows with center-line radius equal to 1.5 times associated duct width and fabricate to include turning vanes in elbows where shorter radius is necessary. Limit angular tapers to 30 degrees for contracting tapers and 20 degrees for expanding tapers.
  - 1. Round Fittings: The following round duct fittings shall be used: two-piece, die- stamped, 45-degree to 90-degree elbows for sizes up to 8 inches; five-piece,

90-degree fully welded elbows for sizes over 8 inches; Lo-Loss conical tees; Lo-Loss reducing tees; Lo-Loss 90-degree cross; bullhead tees; bullhead reducing tees; and conical laterals. All reducers shall be placed after a tap has been made on the duct main. Reducers shall be long-taper style. No exceptions will be made on the above noted fitting requirements.

## 2.5 FLEXIBLE DUCTS:

- A. Flexible ducts may be used in concealed areas where detailed and as specified.
- B. Factory insulate all flexible ducts with one-inch thick, one- pound density fiberglass insulation and wrap with factory- installed vapor barrier jacket. Ducts shall be U.L. approved and tested and meet Class 1 requirements of NFPA 90A. Make elbows to maintain R/W-1.5.
- C. Flexible ducts upstream of air terminal units shall be Thermaflex M-KC with maximum length of five feet.
- D. Flexible ducts from rigid runouts to registers shall be thermaflex M-KE with maximum length of three feet. Flexible duct shall have no bends greater than 45 degrees. Specifications and any applicable drawings or details will be strictly enforced.
- E. Flexible ducts shall consist of an exterior reinforced laminated vapor barrier, 1-1/2-inch thick fiberglass insulation (K= .25 @ 75 degrees F), encapsulated spring steel wire Helix and impervious, smooth, non-perforated interior vinyl liner. Individual lengths of flexible ducts shall contain factory- fabricated steel connection collars.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF DUCTWORK:

- A. Assemble and install ductwork to achieve air tight and noiseless (no objectionable noise) systems capable of performing each indicated service.
- B. Install each run with minimum of joints. Align ductwork accurately at connections within 1/8- inch misalignment tolerance and with internal surfaces smooth. Support ducts rigidly with suitable ties, braces, hangers, and anchors of type which will hold ducts true to shape and to prevent buckling.
- C. Seal ductwork after installation to seal class required and method prescribed in SMACNA "HVAC Leakage Test Manual," latest edition.

Duct Class	Up to 2 in. wg	3 in. wg	4 in. – 10 in. wg or exposed to weather
Seal Class	C	B	A
Sealing	Transverse Joints Only	Transverse Joints and Seams	Joints, Seams, and all Applicable Wall Penetrations
Leakage Class			
Rectangular Metal	16	8	4
Round Metal	8	4	2

- 1. Sealant shall be applied 3 inches wide and 32 mils wet film thickness.
- 2. In ducts of greater than 2" pressure class, or exposed to weather, sealant shall be applied to duct to minimum 3 inches wide, 18 mil thick, scrim applied over the sealant then another 18 mil of sealant applied over the scrim.
- D. Seal ductwork after installation to seal class required and method prescribed in SMACNA "HVAC Leakage Test Manual," latest edition.
  - E. Support ductwork in manner complying with SMACNA "HVAC Duct Construction Standards," latest edition, hangers and supports sections. Where special hanging of ductwork is detailed or shown on Drawings, Drawings shall be followed.

### 3.2 CLEANING AND PROTECTION:

- A. Clean ductwork internally, unit by unit as it is installed, of dust and debris. Clean external surfaces of foreign substances which might cause corrosive deterioration of metal or where ductwork is to be painted.
- B. Strip protective paper from stainless ductwork surfaces, and repair finish wherever it has been damaged.
- C. Temporary Closure: At ends of ducts which are not connected to equipment or air distribution devices at time of ductwork installation, provide temporary closure of polyethylene film or other covering which will prevent entrance of dust and debris until time connections are to be completed.

### 3.3 OPERATION TEST:

- A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

### 3.4 CLEANING UP:

- A. Upon completion of Work remove materials, equipment, apparatus, and tools, and leave premises clean, neat, and orderly.

### END OF SECTION

## SECTION 23 37 00 - AIR OUTLETS AND INLETS

### PART 1 - GENERAL

#### 1.1 CONDITIONS OF THE CONTRACT:

- A. The Conditions of the Contract (General, Supplementary, and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.
- B. Division - 15 Basic Mechanical Materials and Methods apply to work of this section.

#### 1.2 WORK INCLUDED:

- A. Types of ductwork accessories required for this project include the following: outlets

#### 1.3 QUALITY ASSURANCE:

- A. SMACNA Compliance: Comply with applicable portions of Sheet Metal and Air Conditioning Contractor's National Association (SMACNA) HVAC Duct Construction Standards (Metal and Flexible), latest edition, for all work in this section.
- B. ASHRAE Standards: Comply with American Society of Heating, Refrigerating, and Air Conditioning Engineers, Inc. (ASHRAE) recommendations, latest edition, for all work in this section.
- C. NFPA Compliance: Comply with ANSI/NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems," and ANSI/NFPA 90B, "Standard for the Installation of Warm Air Heating and Air Conditioning Systems."

#### 1.4 SUBMITTALS:

- A. Product Data: Submit manufacturer's product data for each type of ductwork accessory, including dimensions, capacities, and materials of construction, and installation instructions.

### PART 2 - MATERIALS

#### 2.1 AIR OUTLETS:

- A. Grilles shall be selected and guaranteed by manufacturer to operate without objectionable noise or draft.
- B. Furnish and install sponge rubber gaskets between grilles and grounds of finished surfaces. Wood grounds will be furnished by others. Metal grounds shall be furnished by this Contractor. Sidewall grilles and registers shall be provided with dull prime coat finish, unless noted otherwise. All supply diffusers, registers, and grilles located at ceiling shall have factory-applied, bone-white finish.
- C. Paint visible ductwork behind grilles, registers, and diffusers dull black.
- D. Outlet  
rueger Series S-480V with OBD. Provide full 24 x 24 ceiling plates at gyp. board ceilings, with frame style to suit gyp. board style.
- E. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown of size, shape, capacity, and type indicated; constructed of materials and components as

indicated and as required for complete installation. Provide diffusers with border styles that are compatible with adjacent ceiling systems and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction Drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.

- F. Available Manufacturers: Subject to compliance with requirements, manufacturers offering air outlets and inlets which may be incorporated in the work include the following:  
Krueger Titus Anemostat

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF AIR OUTLETS AND INLETS:

- A. Install outlets in accordance with manufacturer's written instructions and in accordance with recognized industry practices to ensure that products serve intended functions.
- B. Locate ceiling registers/grilles as indicated on general construction "Reflected Ceiling Plans." Unless otherwise indicated, locate units in center of acoustical ceiling modules.
- C. Examine areas and conditions under which outlets and inlets are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.
- D. Ceiling-mounted air terminals or services shall be positively attached to the ceiling suspension main runners or to cross runners with the same carrying capacity as the main runners.
- E. Terminals or services weighing not more than 56 pounds shall have two No. 12 gauge hangers connected from the terminal or service to the structure above. These wires may be slack.
- F. Terminals or services weighing more than 56 pounds shall be supported directly from the structure above by approved hangers.

### 3.2 CARE AND CLEANING:

- A. Repair or replace broken, damaged, or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Owners Representative. At completion, carefully clean and adjust equipment, fixtures, and trim installed as part of this work. Leave systems and equipment in satisfactory operating condition.

### 3.3 OPERATION TEST:

- A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

### 3.4 CLEANING UP:

- A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like, and leave premises clean, neat, and orderly.

END OF SECTION

## PART 1 - GENERAL

### 1.1 CONDITIONS OF THE CONTRACT:

- A. The Conditions of the Contract (General, Supplementary and other Conditions) and the General Requirements (Sections of Division 1) are hereby made a part of this Section.
- B. Division-23 Basic Mechanical Materials and Methods apply to work of this section.

### 1.2 WORK INCLUDED:

- A. Types of fans and ventilators required for project include the following: Exhaust Fan  
Fresh Air Intake Fan

### 1.3 SUBMITTALS:

- A. Product Data: Submit manufacturer's technical product data and installation instructions for each type of material listed in this SECTION.
- B. Maintenance Data: Submit maintenance data and replacement material lists for each type of material listed in this SECTION. Include this data and product data in maintenance manual.

## PART 2 - MATERIALS

### 2.1 Exhaust Fan:

- A. Centrifugal Ceiling Exhausters: Provide centrifugal ceiling exhausters, designed for ceiling or inline mounting, of type, size and capacity as scheduled.
- B. Provide AMCA Certified Ratings Seal for air flow and sound.
- C. Type: Provide galvanized steel housing lined with acoustical insulation, adaptable for ceiling or inline installation. Provide centrifugal fan wheels mounted on motor shaft with fan shrouds, all removable for service. Provide integral backdraft damper at fan discharge.
- D. Motor: Provide permanent split-capacitor motor, permanently lubricated, with grounded cord and plug.
- E. Electrical: Provide junction box for electrical connection on housing, and receptacle for motor plug-in.
- F. Speed Control: Furnish remote fan speed control, solid state, capable of controlling fan speed from full speed to approximately half speed. Unless noted otherwise, locate speed controller adjacent to fan.
- G. Accessories: Provide manufacturer's standard roof jack, and transition fittings as indicated on drawings or schedules.
- H. Available Manufacturers: Subject to compliance with requirements, manufacturers offering centrifugal ceiling exhausters which may be incorporated in the work include the following:  
Broan  
Penn Ventilator Co., Inc.  
Greenheck

### 2.2 Fresh Air Intake Fan

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering centrifugal ceiling exhausters which may be incorporated in the work include the following:  
ATMO

## PART 3 - EXECUTION

### 3.1 GENERAL:

- A. Install fans and ventilators where indicated, in accordance with equipment manufacturer's installation instructions, and with recognized industry practices, to ensure that equipment complies with requirements and serves intended purposes.
- B. Provide motors so that they cannot be overloaded above nameplate rating throughout the full speed range of the adjustable pitch driving sheave.
- C. Fan wheels shall be balanced statically and dynamically near operating speed.
- D. Provide drives and guards conforming to the requirements hereinbefore specified.

- E. Fan construction, speed, noise level, tip speeds, outlet velocities and efficiencies will be taken into consideration in approval of fans offered. Fans shall be as scheduled on drawings, or approved equal.

3.2 ELECTRICAL CONNECTIONS:

- A. Ensure air distribution equipment is wired properly, with rotation in direction indicated and intended for proper performance.

3.3 CARE AND CLEANING:

HVAC FANS

- A. Repair or replace broken, damaged or otherwise defective parts, materials, and work. Leave entire work in condition satisfactory to Owner's Representative. At completion, carefully clean and adjust equipment and trim installed as part of this work. Leave systems and equipment in satisfactory operating condition.

3.4 OPERATION TEST:

- A. Test each piece of equipment to show that it will operate in accordance with indicated requirements.

3.5 CLEANING UP:

- A. Upon completion of Work remove materials, equipment, apparatus, tools, and the like and leave premises clean, neat and orderly.

END OF SECTION

## SECTION 312001 - STRUCTURAL EARTHWORK

### PART 1 - GENERAL

#### 1.1 DESCRIPTION

- A. Provide all site stripping, excavation, fill, backfill, and grading, as specified therein, and as noted on the Drawings.
- B. Related Work: 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.

#### 1.2 QUALITY ASSURANCE

- A. Geotechnical Engineer: The Owner will retain and pay the expenses of a Geotechnical Engineer for performing certain functions specified in the Contract Documents. The Geotechnical Engineer shall communicate only with the Owner and the Owners Representative, and with the Contractor as directed by the Owners Representative. The Owners Representative shall relay any appropriate instructions to the Contractor within the provisions of the Contract Documents.
- B. Testing Agency: Local testing laboratory with a minimum of three years experience in testing soil materials. All reports prepared by the Testing Agency shall be signed by a Professional Engineer registered to practice as a Civil Engineer in the state of Michigan.
- C. Testing laboratory shall have the same required qualifications as the Testing Agency but shall be retained by the Owner. Testing laboratory will make field tests as directed of the "in place" materials to assure conformance with Contract Documents.
- D. Source Quality Control: Prior to delivery to site, the Testing Agency shall test all imported soil material for conformance with Contract Documents. Also on site fill materials shall be approved by the Geotechnical Engineer prior to placing.
- E. Use adequate numbers 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.
- F. Use equipment adequate in size, capacity, and numbers to accomplish the Work of this Section in a timely manner.
- G. Reference Standards:
  - 1. ASTM - American Society for Testing and Materials.
    - a. D 422 - Particle Size Analysis of Soils.
    - b. D 424 - Plastic Limit and Plasticity Index of Soils.
    - c. D 1556 - Standard Test Method for Density of Soil in Place by the Sand Cone Method.
    - d. D 1557 - Standard Test Methods for Moisture-Density Relations of Soils Using 10-pound Rammer and 18-inch Drop.
    - e. D 2487 - Classification of Soils for Engineering Purposes.
    - f. D 3017 - Moisture Content of Soil and Soil-aggregate in place by Nuclear Methods.

#### 1.3 SUBMITTALS

- A. Test Reports: Submit test reports on proposed imported materials, and compaction test reports on all compacted materials.

#### 1.4 JOB CONDITIONS

- A. Existing Conditions:
  - 1. Soils Data: No soils investigation report was prepared for this project.
    - a. The absence of records of investigations of soil or subsurface conditions and/or logs of test borings:
      - 1) Shall not be construed as a waiver of the Contractor's duty to examine the site of the Work as contemplated and the Contractor is cautioned to make such independent investigations and examinations as he deems necessary to satisfy himself as to the subsurface conditions to be encountered in the performance of the Work.
      - 2) Will not relieve the Contractor from the risk of unanticipated soil or subsurface conditions or from properly fulfilling the terms of the Contract or the Contract



Sum.

2. Information shown on the Drawings regarding existing site conditions is believed to be correct, but it is not guaranteed. Contractors shall visit the site for necessary information and data regarding present ground levels, ground water level, conditions of property, locations and size of obstructions, and access, etc.
  3. Where existing utilities are encountered which are not shown on the Drawings or evident from a site inspection, contact the Owners Representative immediately for instructions. If such lines are inadvertently broken through no fault of the Contractor's operation, they shall be repaired by the Contractor, and an adjustment will be made in payment by the Owner. Breakage of lines shown on the Drawings or evident by a site inspection will be repaired by the Contractor at no increase in Contract Sum.
- B. Protection:
1. Provide, and maintain all barricades, shoring, bracing, etc., as required by federal and State codes. Contractor shall assume all responsibility for damage to utilities, streets, etc., that may be caused by this Work.
  2. Maintain temporary drainage routes during construction so that rainfall or snow-melt will drain from site and not accumulate or pond.
- C. Sequencing, Scheduling and Coordination: The Contractor may schedule and sequence his operations as he desires to optimize the Work of this SECTION.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. For structural fill and backfill use imported or approved on-site materials which are non-expansive conforming to the following: Granular soil, free of organic material and debris and free of clods, lumps and rocks larger than 4-inch diameter. Material shall be reasonably well graded with not more than 40-percent passing a No. 200 sieve, not more than 70-percent passing a No. 40 sieve, and not less than 70 percent passing a  $\frac{3}{4}$ " sieve, liquid limit – 35 maximum, plastic index – 15 maximum. All material shall be approved by the Geotechnical Engineer prior to delivery and use.
- B. Site non-structural fill may be any on site materials free of debris and rocks larger than 4-inch diameter or imported materials as specified in "A" above.
- C. Drain Rock: Provide clean, crushed 1" minus rock or open graded drain rock, or use a  $\frac{3}{4}$ " rock topped with chips to prevent concrete from penetrating the drain rock. Drain Rock materials shall be approved by the Geotechnical Engineer prior to delivery and use.
- D. Moisture Barrier: A moisture barrier shall be provided under all interior slabs on grade unless noted otherwise. It shall be placed directly below the aggregate base. The moisture barrier shall be Mirafi "MCF-1212", Stego Wrap 15 mil, or approved equal.
- E. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Owners Representative.

## PART 3 - EXECUTION

### 3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.2 PREPARATION

- A. Lay out the building and all site work in conformance with Contract Documents. Establish necessary benchmarks. Protect them and existing benchmarks shown on the Site Plan, until completion of the Work.

### 3.3 PERFORMANCE

- A. Perform no earthwork during inclement weather, or when excessive moisture is present in the fill material.
- B. Should rainfall or snow-melt occur following footing excavation and prior to pouring footing, dry the excavation thoroughly and recompact the soils below the footing prior to placing footing.
- C. Use no frozen fill. Place no fill on frozen ground.
- D. When rains or snow-melt interrupt fill operations, inspect the surface before more fill is placed to assure that detrimental conditions do not exist.
- E. Clearing and Grubbing: The areas to receive compacted fill for support of foundations, paving, and slabs shall be stripped of all debris, fill soils, crop growth, vegetation, surface trash, roots larger than 2 inches in diameter, and incidental topsoils as determined by the Geotechnical Engineer.
- F. Stripping: The upper 12", as determined by the Geotechnical Engineer, shall be removed from structural areas prior to placement of footings, aggregate base, or structural fill. Also any existing debris and former construction shall be completely removed from the site.
- G. Excavation:
  - 1. Excavate as necessary to obtain required subgrade elevations.
  - 2. Excavate as necessary to allow room for placement and removal of foundation formwork.
  - 3. Form all footings with wood, metal, or earth forms as specified in SECTION 031000, "CONCRETE FORMWORK."
- H. Compaction of Exposed Soils: The soils exposed by excavations, which are to receive compacted fill or footings, shall be scarified, watered or dried as necessary to obtain the proper moisture content as directed by the Geotechnical Engineer, and compacted to a depth of 12", to at least 95-percent of maximum dry density. If, in the opinion of the Geotechnical Engineer, the existing soils at the bottom of the footing excavations are at 95-percent of maximum dry density or above, then these soils may not require scarification and recompaction, as determined by the Geotechnical Engineer.
- I. Fill and Backfill:
  - 1. Fill as required to obtain required subgrades.
  - 2. Backfill foundations and stemwalls.
  - 3. Place fill and backfill materials in 8-inch thick maximum loose layers. In general, place in horizontal layers extending uniformly over the area to be filled. Compact each layer as specified prior to placing the subsequent layer.
  - 4. Water or dry fill materials as necessary to obtain the proper moisture content as directed by the Geotechnical Engineer. These soils shall then be compacted to the following minimum densities, based on ASTM D1557 Method A or C.
    - a. Structural fill - at least 95-percent dry density for fills under footings or slabs on grade.
    - b. Non-structural fill on site - 90-percent minimum dry density.
- J. Moisture Barrier:
  - 1. Where moisture barrier is required by plans, place moisture barrier beneath aggregate base. Place, lap and tape seams in accordance with manufacturer recommendations.
- K. Aggregate Base:
  - 1. Provide the aggregate base placed on top of the moisture barrier membrane and compact to at least 95 percent under pavement and other exterior and interior slabs. Also compact the upper 12" of subgrade below this base to 95 percent relative compaction.
  - 2. Establish finish grade of base at the required elevation with a level uniform surface varying not more than 1/2-inch when measured in any direction with a 10-foot straight edge.
  - 3. Compact drainrock by two passes at right angles with an approved vibratory compactor.
- L. Site Grading:
  - 1. After completion of all excavation, fill and backfill, rake surface to a 4-inch depth to remove all rocks and debris in excess of 2-inches in diameter. Remove this material from the site.
  - 2. Grade all areas including excavated and filled sections and transition areas to obtain a finished surface, reasonably smooth, compacted, and free from irregular surface changes. Leave all ditches, swales, and gutters finished to drain readily.

3.4 FIELD QUALITY CONTROL

- A. Soil Compaction Test: The Owner will pay the testing Laboratory for the first compaction test at any test location. All retests required because fill materials were not compacted to the required density shall be paid for by the Contractor.
- B. The Geotechnical Engineer shall review all sitework and footing excavations before any concrete is cast, and submit a letter of compliance to the Owners Representative. The Geotechnical Engineer shall review all backfill materials prior to placement and observe backfill operations. A letter of compliance shall be submitted to the Owners Representative stating that fills have been constructed per the requirements of these Specifications.
- C. Provide at least the following tests to the approval of the Geotechnical Engineer:
  - 1. At paved areas, at least one (1) field density test for every 4000 sq. ft. of paved area, but not less than three (3) tests.
  - 2. In each compacted fill layer, one (1) field density test for every 4000 sq. ft. of overlaying area, but not less than three (3) tests.
- D. If, in the Geotechnical Engineer's opinion, based on reports of the testing laboratory, subgrade or fills have been placed below specified density, provide additional compacting and testing.

3.5 MAINTENANCE

- A. Protection of newly graded areas:
  - 1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds.
  - 2. Repair and reestablish grades in settled, eroded, and rutted areas to the specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

END OF SECTION 312001