

SECTION 00 01 01

**PROJECT MANUAL**

**ISSUED FOR BID**

**FOR**

**UMF PURINGTON & MALLETT HALL  
RESTROOM RENOVATIONS**

UNIVERSITY OF MAINE FARMINGTON

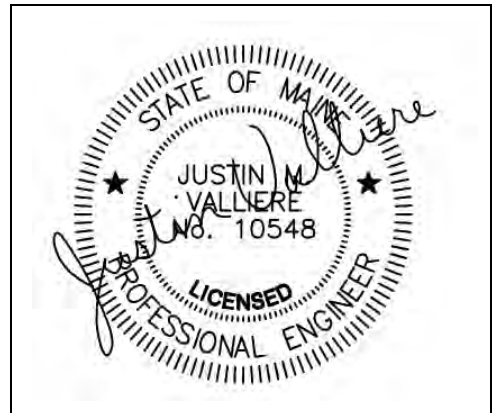
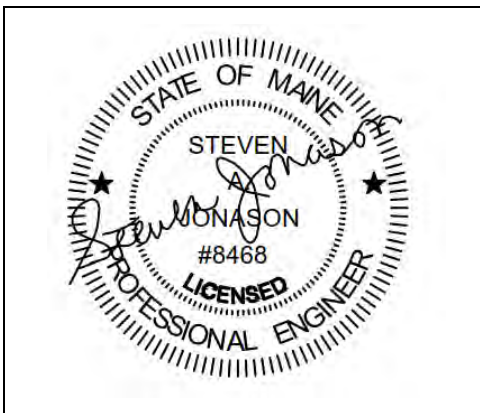
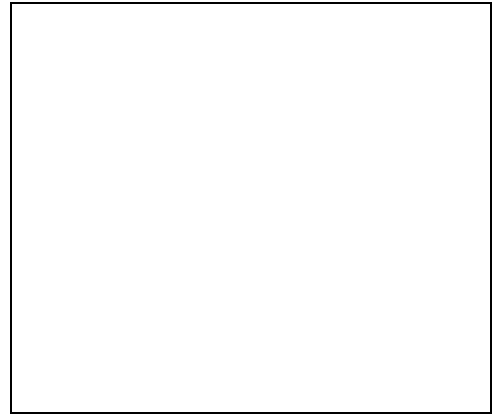
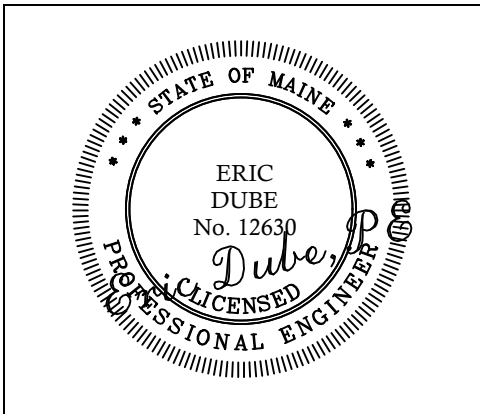
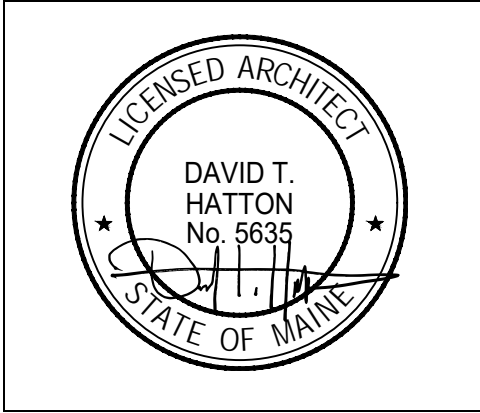
September 15, 2023

Prepared by:

CHA Architecture

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## **PURINGTON HALL**

A000 COVER SHEET

### **CIVIL**

C1.0 SITE PLAN

### **STRUCTURAL**

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S1.0 FOUNDATION & FIRST FLOOR FRAMING PLAN  
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### **MECHANICAL**

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**ELECTRICAL**

E000 GENERAL NOTES AND LEGENDS  
ED1-00 BASEMENT DEMO PLANS  
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E1-04 ATTIC ELECTRICAL PLAN

END OF SECTION 00 01 15

SECTION 00 11 13  
ADVERTISEMENT FOR BIDS

**Bids for: UMF PURINGTON & MALLETT HALL RESTROOM RENOVATIONS**

Shall be submitted electronically to [cppmquestions@maine.edu](mailto:cppmquestions@maine.edu)  
With the following Email Subject Line: **UMF PURINGTON & MALLETT HALL RESTROOM RENOVATIONS**

Bids will be received until **2 pm** on **Thursday, October 12** at which time Bids will be opened and read aloud via Zoom.

Bid opening attendance is available via PC, Mac, Linux, iOS or Android:  
[Zoom](https://maine.zoom.us/j/81087661257?pwd=djliVERKL1RVdm5pZnhqWjZ3cjNQQT09) Link: <https://maine.zoom.us/j/81087661257?pwd=djliVERKL1RVdm5pZnhqWjZ3cjNQQT09>  
Password: 506707  
Or via telephone US: (US) +1 312-626-6799  
Meeting ID: 81087661257  
Password: 506707

Bids received after the stated time will not be considered and will be returned unopened.

Electronic bid submission must be accompanied by a copy of a satisfactory Bid Bond for 5% of the Bid (checks will not be accepted) which shall be in conformity with the form of Bond contained in Section 00 43 13 of the Specifications. Upon determination of the apparent low bidder, the University will contact the low bidder and request an original hard copy of the bid bond be delivered within 72 hours. The University reserves the right to waive all formalities and reject any or all bids or to accept any bids. Scholarships, donations or gifts to the University will not be considered in the evaluation of responses.

**Electronic Bid Submission Requirements:**

A **SIGNED** virus-free electronic bid form must be submitted as follows:

- The bid and bid bond must be submitted electronically as a single PDF file to the email address shown above.
- Electronic submission must be received by the required **Date/Time** reflected above.

The successful Bidder will be required to furnish a 100% Performance Bond and a 100% Payment Bond to cover the execution of the Contract which shall be in conformity with the form of Bonds contained in Sections 00 61 13.13 and 00 61 13.16, respectively, of the Specifications and shall be for the Contract amount.

Bidders should attend a mandatory pre-bid meeting on Tuesday, September 26<sup>th</sup> at 9 am. Attendees are to meet at Purington Hall at 172 High Street in Farmington. Copies of plans and specifications will not be available at the pre-bid meeting. Acquiring or reviewing plans and specifications prior to the meeting is advised.

**Project Summary:** The Work consists of the following:

1. Renovation of bathrooms to provide ADA compliant, single user bathrooms.
2. New Laundry room on First Floor at both buildings.
3. New kitchen at Mallett Hall.
4. Replacement of select doors and frames.
5. Addition of a Limited Use / Limited Application (LU/LA) elevator to access all floors of each building.
6. Provision of exterior ramps at building entrances for ADA access.

The electronic documents (.pdf) may be examined and downloaded at the following site:

<https://www.umf.maine.edu/facilities/home/advertisements-facilities-management/>

Any questions related to the plans and specifications must be submitted prior to **4 pm** on **Monday, October 2, 2023**, via email to Richard Beaulieu, Project Manager, University of Maine System; [cppmquestions@maine.edu](mailto:cppmquestions@maine.edu)

The University of Maine System is an EEO/AA institution and does not discriminate on the grounds of race, color, religion, sex, sexual orientation, transgender status, gender, gender identity or expression, ethnicity, national origin, citizenship status, familial status, ancestry, age, disability physical or mental, genetic information, veteran or military status in employment, education, and all other programs and activities. The following person has been designated to handle inquiries regarding non-discrimination policies: Director of Equal Opportunity, 101 Boudreau Hall, University of Maine, Orono, ME 04469-5754, 207.581.1226, TTY 711 (Maine Relay System). The University provides reasonable accommodation to qualified individuals with disabilities upon request. General contractors, subcontractors, and product suppliers bidding on this project must subscribe and adhere to the same.

UNIVERSITY OF MAINE SYSTEM  
by and through  
UNIVERSITY OF MAINE  
Laurie Gardner, Chief Business Officer, for  
University of Maine System Board of Trustees

END OF SECTION 00 11 13

SECTION 00 21 13  
INSTRUCTIONS TO BIDDERS

1. At the time of the opening of bids, each bidder will be presumed to have inspected the site and to have read and to be thoroughly familiar with the plans and contract documents, including all addenda. The failure or omission of any bidder to receive or examine any form, instrument, or document shall not relieve any bidder from any obligation in respect to the bid. The Owner reserves the right to accept or reject any or all bids as may best serve the interests of the University of Maine System.
2. Subject to the University System's right, reserved herein, to accept or reject any or all bids, the General Contractor will be selected on the basis of the sum of the lowest base bid, plus such of the alternates as the University System desires to use.
3. The University System is exempt from the payment of Federal Excise Taxes on articles not for resale and the Federal Transportation Tax on all shipments. The Contractor shall quote less these taxes. Upon application, exemption certificates will be furnished when required.
4. No proposal may be withdrawn during a period of thirty (30) calendar days immediately following the opening thereof.
5. No contract may be assigned, sublet or transferred without the written consent of the University of Maine System.
6. All individuals not residents of this State must comply with the provisions of 14 MRSA §704-A.
7. The successful bidder, or bidders, will be required to furnish 100% Contract Bonds to cover the execution of the contract, in accordance with the AIA Document A101 - 2017 Exhibit A and Article 11 of the AIA Document A201 - 2017 General Conditions of the Contract for Construction.
8. Contractors may be required to furnish a statement of their business experience, record of accomplishments, and financial responsibility, at the discretion of the University System.
9. The base bid shall be based on the materials, methods, equipment and products, as specified.
10. Bidders shall submit the bid on the Bid Form provided in the Specifications, Section 00 41 13.
11. Any materials, methods, equipment and products not herein specified, but worthy of consideration by any General or Subcontractor, may be introduced by a separate letter attached to the regular bid. The Bidder shall state the cost comparison with the specified materials, methods, equipment and products, and the reason for the suggested substitution. It shall be understood by all bidders that the attached letter proposing substitutions shall not be used to determine the low bidder and that all bids are based on specified products.
12. Telegraphic or facsimile proposals will not be considered, but modification of proposals already submitted will be considered if received prior to the hour set for receipt of proposals. If the telegram or facsimile discloses the amount of the proposal, the proposal will be declared invalid. The bidder bears full responsibility to assure that the correction is delivered to the proper location and within the time required.
13. Where a bidder wishes a product to be considered an "approved equal" for bidding purposes, the product, along with all supporting documentation, shall be submitted to the architect for review a minimum of 10 calendar days prior to the bid opening date or the file bid due date, if file bids are required on the project. Products which are determined to be an "approved equal" for bidding purposes shall be listed in an addendum issued so as to be received by bidders no less than 72 hours prior to the bid date or the file bid due date if file bids are required.
14. Where the Bid Form requires the tabulation of subcontractors other than "File Bidders," the Bidder shall list the name of the firm the bidder intends to use in the event the bidder receives the contract award.
15. Bidders may appeal the award decision by submitting a written protest to the University of Maine System

Chief Facilities and General Services Officer within five (5) business days of the date of the award notice (Notice of Award) with a copy of the protest to the successful bidder. The protest must contain a statement of the basis for the challenge.

END OF SECTION 00 21 13

SECTION 00 41 13  
BID FORM – SHORT FORM

BIDDER: \_\_\_\_\_  
Physical/Street Address \_\_\_\_\_  
City, State ZIP \_\_\_\_\_

University of Maine  
Office of Facilities Management  
Carolyn McDonough, Director of Capital Planning & Project Management  
5765 Service Building  
Orono ME 04469-5765

Having carefully examined the form of contract, general conditions and plans and specifications contained therein for UMF Purington & Mallett Hall Restroom Renovations, as well as the premises and conditions affecting the work, we the undersigned propose to furnish all labor, equipment, and materials necessary for and reasonably incidental to the construction and completion of this contract for the sum of:

**Purington Hall base bid** \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$ \_\_\_\_\_).

Purington Alternate prices as follows:

Alternate 1. Add Ramps at entrance to buildings \$ \_\_\_\_\_  
Alternate 2. Add Limited Use/Limited Application Elevator \$ \_\_\_\_\_  
Alternate 3. Add Condensing unit and refrigerant piping \$ \_\_\_\_\_

**Mallett Hall base bid** \_\_\_\_\_  
\_\_\_\_\_ Dollars (\$ \_\_\_\_\_).

Mallett Alternate prices as follows:

Alternate 1. Add Ramps at entrance to buildings \$ \_\_\_\_\_  
Alternate 2. Add Limited Use/Limited Application Elevator \$ \_\_\_\_\_  
Alternate 3. Add Condensing unit and refrigerant piping \$ \_\_\_\_\_

This proposal includes the cost of 100% Performance Bond plus 100% Payment Bond.

The receipt of the following addenda to plans and specifications is hereby acknowledged:

ADDENDUM # \_\_\_\_\_ DATED \_\_\_\_\_ ADDENDUM # \_\_\_\_\_ DATED \_\_\_\_\_  
ADDENDUM # \_\_\_\_\_ DATED \_\_\_\_\_ ADDENDUM # \_\_\_\_\_ DATED \_\_\_\_\_

Any material or materials not specified in the bidding document but worthy of consideration may be introduced by the bidder by a separate letter attached to this Bid. A cost comparison must be included giving the comparison with the Material specified and the reason for the suggested substitution. The basic bid shall be as specified.

The undersigned agrees, if this Bid is accepted to sign a contract and deliver it, along with the bonds and affidavits for all insurance specified within twelve (12) calendar days after the date of notification of such

acceptance, except if the 12th day falls on a Saturday, Sunday or holiday, then the conditions will be fulfilled if the required documents are received before 12 o'clock noon on the day following the holiday, or the Monday following the Saturday or Sunday, and as a guarantee thereof, herewith submits a bid bond as required.

The undersigned agrees, if awarded the Contract, to substantially complete the work on or before July 2, 2024. The undersigned also agrees, if awarded the Contract, that no more than 80% of the contract amount will be sublet to other contractors.

Signed (by individual authorized to sign contract) \_\_\_\_\_

By (printed name & title) \_\_\_\_\_ Phone \_\_\_\_\_

PO Box (if applicable) \_\_\_\_\_ Email \_\_\_\_\_

NOTE: If bidder is a corporation, write State of Incorporation, and if a partnership, give full names of all partners.

END OF SECTION 00 41 13

SECTION 00 43 13

BID SECURITY FORM

KNOW ALL BY THESE PRESENTS, THAT WE, the undersigned, as PRINCIPAL \_\_\_\_\_  
\_\_\_\_\_, and \_\_\_\_\_  
\_\_\_\_\_ as SURETY, are hereby held and firmly bound unto the Treasurer  
of the UNIVERSITY OF MAINE SYSTEM in the penal sum of \_\_\_\_\_  
\_\_\_\_\_ for the payment of which, well and truly to  
be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors and  
assigns, signed this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_.

The condition of the above obligation is such that whereas the Principal has submitted to UNIVERSITY OF  
MAINE SYSTEM, BY AND THROUGH THE UNIVERSITY OF MAINE, a certain proposal, attached hereto  
and hereby made a part hereof, to enter into a contract in writing for the  
UMF Purington & Mallett Restroom Renovation

NOW THEREFORE,

- (a) If said proposal shall be rejected, or, in the alternate
- (b) If said proposal shall be accepted and the Principal shall execute and deliver a contract in the form of  
contract attached hereto (properly completed in accordance with said proposal) and shall furnish a bond for  
faithful performance of said contract, and for the payment of all persons performing labor or furnishing  
materials in connection therewith, and shall in all other respects perform the agreement created by the  
acceptance of said proposal, then this obligation shall be void, otherwise the same shall remain in force and  
effect: It being expressly understood and agreed that the liability of the surety for any and all claims  
hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligation of said Surety and its bond shall  
be in no way impaired or affected by any extension of the time within which the principal may accept such  
proposal: and said Surety does hereby waive notice of any such extension.

In the event suit is brought upon this bond by the Treasurer of the UNIVERSITY OF MAINE SYSTEM, Surety  
shall pay reasonable attorneys' fees and costs incurred by the Treasurer of the UNIVERSITY OF MAINE  
SYSTEM in such suit.

IN WITNESS WHEREOF, the Principal and Surety have hereunto set their hands and seals, and such of them  
as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their  
proper officers, the day and year first set above.

PRINCIPAL: \_\_\_\_\_

By: \_\_\_\_\_  
L.S.

SURETY: \_\_\_\_\_

SURETY ADDRESS: \_\_\_\_\_

By: \_\_\_\_\_  
L.S.

**\*\*DO NOT ALTER LANGUAGE\*\***

END OF SECTION 00 43 13

SECTION 00 51 00

NOTICE OF AWARD

DATE

Vendor Name  
Vendor Address.  
Vendor Address

RE: ***NOTICE OF AWARD – PROJECT NAME***  
***UNIVERSITY OF MAINE FARMINGTON***

Dear (vendor name),

You are hereby notified that the University of Maine System, by and through the University of Maine, accepts your Bid of **\$00.00** for the above named project, subject to final resolution of any bid protests and the parties' ability to establish and confirm final terms, as well as the execution of a written contract and your furnishing satisfactory bonds within twelve (12) calendar days as provided in the bidding documents.

This Notice of Award will permit you to proceed with the ordering of materials and scheduling the work so that the project can be completed on time. Should you fail to execute a contract or furnish satisfactory bonds within the stipulated time, the bid bond accompanying your proposal will be forfeited to the University of Maine System as liquidated damages.

Enclosed is your contract agreement for signature. Further, please have your surety provide one original each of the Performance Bond and the Payment Bond, as prescribed in Sections 00 61 13.13 and 00 61 13.16 of the bid document, and a properly executed "Power of Attorney." Please advise your surety agent that the bonds should carry the same date as this Notice of Award and the Contract Agreement. **All originals of the signed contract, bonds and insurance certificates should be forwarded directly to Sandra Binette, Capital Contracts Administrator, 5765 Service Building, Orono, ME 04469.** Once it is completely signed, a copy of the contract will be returned for your use.

Prior to the start of any work on the construction site, Capital Planning and Project Management must receive Certificates of Liability Insurance as specified in Article A.3 of the AIA Document A101 – 2017 Exhibit A, Insurance and Bonds. Please advise your surety that the certificate holder should be as follows: University of Maine System; Office of Risk Management; Robinson Hall, 46 University Drive, Augusta, ME 04330.

The day-to-day administrative and technical details of this project will be handled by the Architect/Engineer, insert name here. All correspondence relative to the day-to-day administration of the project should be directed to insert name, insert title, insert email; 207-000-0000.

A pre-construction conference on this project will be scheduled as soon as possible. This conference must be attended by your firm's authorized representative as well as your project superintendent.

Sincerely,

Laurie A. Gardner  
Chief Business Officer

Enclosures

END OF SECTION 00 51 00

**SAMPLE  
UNIVERSITY OF MAINE SYSTEM  
Construction Contract Agreement**

THIS AGREEMENT is made and entered into the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between the Contractor, \_\_\_\_\_, and the University of Maine System acting by and through the University of Maine, 5765 Service Building, Orono, ME 04469, hereinafter called the Owner.

WITNESSETH: That the Owner and the Contractor for the considerations hereinafter named agree as follows:

**ARTICLE 1. SCOPE OF THE WORK**

The Contractor shall furnish all of the materials and perform all of the work described in the Contract Documents entitled [INSERT PROJECT NAME HERE], prepared by [Insert name of Architect/Engineer here], acting as and in these Contract Documents entitled the Architect and/or Engineer.

**ARTICLE 2: START AND TIME OF COMPLETION**

The date of the commencement of work shall be the date of this Agreement and shall be substantially completed on or before \_\_\_\_\_ subject to adjustments as provided in the Contract Documents.

The Contractor and the Contractor's surety, if any, shall be liable for and shall pay the Owner the following stipulated liquidated damages for each calendar day of delay after the date established for Substantial Completion until the Work is substantially complete: \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) per calendar day.

**ARTICLE 3: THE CONTRACT SUM**

The Owner shall pay the Contractor for the performance of the Contract as follows \_\_\_\_\_ Dollars, \$ (\_\_\_\_\_), subject to adjustments as provided in the Contract Documents.

The Contract Sum is based upon the following Alternates and Unit Prices, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

Alternate (1) _____	Alternate (2) _____	Alternate (3) _____
Unit Prices		
Item _____	Price _____	
Item _____	Price _____	

Final payment shall be made after completion and acceptance of the work as provided in the Contract Documents.

**ARTICLE 4: THE CONTRACT DOCUMENTS**

The Contract Documents for this project, except for modifications issued after execution of this agreement, consist of:

- .1 This agreement.
- .2 AIA Document A201-2017, General Conditions of the Contract for Construction, as modified by the Owner.

- .3 AIA A101 – 2017, Exhibit A, Insurance and Bonds, as modified by the Owner.
- .4 The Specifications as outlined in the Project Manual: [Insert Name of Project Here], dated \_\_\_\_\_.
- .5 The Drawings as listed in the Project Manual.
- .6 The Addenda: Addendum 01 dated \_\_\_\_\_.
- .7 Exhibit B, Contractor's Proposal dated \_\_\_\_\_.

ARTICLE 5: OWNER'S REPRESENTATIVES

The Owner's Representative on this project will be \_\_\_\_\_, who is authorized to sign contracts and other legal documents related to this project on behalf of the Owner.

The Owner's Project Manager on this project will be \_\_\_\_\_.

The Owner and the Contractor hereby agree to the full performance of the covenants herein.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement on the day and year first above written.

UNIVERSITY OF MAINE SYSTEM  
by and through  
University of Maine

\_\_\_\_\_  
Company

\_\_\_\_\_  
Company

By:

\_\_\_\_\_  
[Insert Signatory Name]  
[Insert Signatory Title]  
University of Maine

By:

\_\_\_\_\_

END OF SECTION 00 52 13

SECTION 00 61 13.13

PERFORMANCE BOND FORM

Bond No. \_\_\_\_\_

KNOW ALL BY THESE PRESENTS THAT (1) \_\_\_\_\_  
 \_\_\_\_\_ (2) \_\_\_\_\_  
 of \_\_\_\_\_ and State of \_\_\_\_\_, as PRINCIPAL,  
 and (3) \_\_\_\_\_,  
 a corporation duly organized under the laws of the State of \_\_\_\_\_ and  
 having a usual place of business in \_\_\_\_\_, as SURETY, are held  
 and firmly bound unto the University of Maine System in the sum of \_\_\_\_\_  
 Dollars  
 (\$ \_\_\_\_\_), to be paid said Treasurer of the University of Maine System, or successor  
 in office, for which payment well and truly to be made, Principal and Surety bind themselves, their heirs,  
 executors and administrators, successors and assigns, jointly and severally by these presents.

The condition of this obligation is such that if the Principal shall promptly and faithfully perform the Contract  
 entered into on the (4) \_\_\_\_\_ day of \_\_\_\_\_, A.D., 20\_\_\_\_ for the  
 construction of (5) \_\_\_\_\_

then this obligation shall be null and void; otherwise, it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the University of Maine  
 System.

Signed and sealed this (4) \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

WITNESSES:

SIGNATURES:

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

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

Bonding Company Agent:

Company: \_\_\_\_\_

Street: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

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

- (1) Correct name of Contractor.
- (2) A corporation, a partnership, or an individual, as the case may be.
- (3) Correct name of Surety.
- (4) Same date as that of contract.
- (5) Name of Project as designated in contract.

If Contractor is a partnership, all partners should execute bond. A Power of Attorney document, together with a  
 statement that it still is in effect shall be provided by the person executing this bond. Bond must be  
 countersigned by a Resident Maine Agent.

**\*\*DO NOT ALTER LANGUAGE\*\***

END OF SECTION 00 61 13.13



# AIA® Document G715™ – 2017

## Supplemental Attachment for ACORD Certificate of Insurance 25

<b>PROJECT:</b> <i>(name and address)</i> Samples	<b>CONTRACT INFORMATION:</b> Contract For: Date:	<b>CERTIFICATE INFORMATION:</b> Producer: Insured: Date:
<b>OWNER:</b> <i>(name and address)</i> University of Maine System by and through University of Maine 5765 Service Building Orono, ME 04469	<b>ARCHITECT:</b> <i>(name and address)</i>	<b>CONTRACTOR:</b> <i>(name and address)</i>

A. General Liability	Yes	No	N/A
1. Does this policy include coverage for:			
a Damages because of bodily injury, sickness, or disease, including occupational sickness or disease, and death of any person?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b Personal injury and advertising injury?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c Damages because of physical damage to or destruction of tangible property, including the loss of use of such property?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d Bodily injury or property damage arising out of completed operations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e The Contractor's indemnity obligations included in the Contract Documents?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Does this policy contain an exclusion or restriction of coverage for:			
a Claims by one insured against another insured, where the exclusion or restrictions is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c Claims for bodily injury other than to employees of the insured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d Claims for the Contractor's indemnity obligations included in the Contract Documents arising out of injury to employees of the insured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e Claims for loss excluded under a prior work endorsement or other similar exclusionary language?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g Claims related to residential, multi-family, or other habitational projects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h Claims related to roofing?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i Claims related to exterior insulation finish systems, synthetic stucco, or similar exterior coatings or surfaces?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j Claims related to earth subsistence or movement?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
k Claims related to explosion, collapse, and underground hazards?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
 B. Other Insurance Coverage	 Yes	 No	 N/A
1. Indicate whether the Contractor has the following insurance coverages and, if so, indicate the coverage limits for each.			
a Professional liability insurance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coverage limits:			
b Pollution liability insurance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Coverage limits:
- c** Insurance for maritime liability risks associated with the operation of a vessel ☐ ☐ ☐
- Coverage limits:
- d** Insurance for the use or operation of manned or unmanned aircraft ☐ ☐ ☐
- Coverage limits:
- e** Property insurance ☐ ☐ ☐
- Coverage limits:
- f** Railroad protective liability insurance ☐ ☐ ☐
- Coverage limits:
- g** Asbestos abatement liability insurance ☐ ☐ ☐
- Coverage limits:
- h** Insurance for physical damage to property while it is in storage and in transit to the construction site ☐ ☐ ☐
- Coverage limits:
- i** Other: ☐ ☐ ☐

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*(Authorized Representative)*

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*(Date of Issue)*

**ACORD™ CERTIFICATE OF LIABILITY INSURANCE**

DATE (MM/DD/YY)

PRODUCER	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.	
	INSURERS AFFORDING COVERAGE	
INSURED	INSURER A:	
	INSURER B:	
	INSURER C:	
	INSURER D:	
	INSURER E:	

**COVERAGES**

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
	<b>GENERAL LIABILITY</b> <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input type="checkbox"/> OCCUR  GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC				EACH OCCURRENCE	\$
					FIRE DAMAGE (Any one fire)	\$
					MED EXP (Any one person)	\$
					PERSONAL & ADV INJURY	\$
					GENERAL AGGREGATE	\$
					PRODUCTS - COMP/OP AGG	\$
	<b>AUTOMOBILE LIABILITY</b> <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS				COMBINED SINGLE LIMIT (Ea accident)	\$
					BODILY INJURY (Per person)	\$
					BODILY INJURY (Per accident)	\$
					PROPERTY DAMAGE (Per accident)	\$
	<b>GARAGE LIABILITY</b> <input type="checkbox"/> ANY AUTO				AUTO ONLY - EA ACCIDENT	\$
					OTHER THAN EA ACC	\$
					AUTO ONLY: AGG	\$
	<b>EXCESS LIABILITY</b> <input type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS MADE  <input type="checkbox"/> DEDUCTIBLE <input type="checkbox"/> RETENTION \$				EACH OCCURRENCE	\$
					AGGREGATE	\$
						\$
						\$
						\$
	<b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b>				WC STATU-TORY LIMITS	OTH-ER
					E.L. EACH ACCIDENT	\$
					E.L. DISEASE - EA EMPLOYEE	\$
					E.L. DISEASE - POLICY LIMIT	\$
	<b>OTHER</b>					

**DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS**

University of Maine System is named an additional insured under General Liability.

Project:

**CERTIFICATE HOLDER**

ADDITIONAL INSURED; INSURER LETTER: \_\_\_\_\_

**CANCELLATION**

University of Maine System  
 Office of Risk Management  
 Robinson Hall  
 46 University Drive  
 Augusta, ME 04330

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL \_\_\_\_\_ DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

## **IMPORTANT**

If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

## **DISCLAIMER**

The Certificate of Insurance on the reverse side of this form does not constitute a contract between the issuing insurer(s), authorized representative or producer, and the certificate holder, nor does it affirmatively or negatively amend, extend or alter the coverage afforded by the policies listed thereon.

Sample

# COMMERCIAL GENERAL LIABILITY COVERAGE FORM

Various provisions in this policy restrict coverage. Read the entire policy carefully to determine rights, duties and what is and is not covered.

Throughout this policy the words "you" and "your" refer to the Named Insured shown in the Declarations, and any other person or organization qualifying as a Named Insured under this policy. The words "we", "us" and "our" refer to the company providing this insurance.

The word "insured" means any person or organization qualifying as such under Section II – Who Is An Insured.

Other words and phrases that appear in quotation marks have special meaning. Refer to Section V – Definitions.

## SECTION I – COVERAGES

### COVERAGE A BODILY INJURY AND PROPERTY DAMAGE LIABILITY

#### 1. Insuring Agreement

- a. We will pay those sums that the insured becomes legally obligated to pay as damages because of "bodily injury" or "property damage" to which this insurance applies. We will have the right and duty to defend the insured against any "suit" seeking those damages. However, we will have no duty to defend the insured against any "suit" seeking damages for "bodily injury" or "property damage" to which this insurance does not apply. We may, at our discretion, investigate any "occurrence" and settle any claim or "suit" that may result. But:

- (1) The amount we will pay for damages is limited as described in Section III – Limits Of Insurance; and
- (2) Our right and duty to defend ends when we have used up the applicable limit of insurance in the payment of judgments or settlements under Coverages A or B or medical expenses under Coverage C.

No other obligation or liability to pay sums or perform acts or services is covered unless explicitly provided for under Supplementary Payments – Coverages A and B.

- b. This insurance applies to "bodily injury" and "property damage" only if:

- (1) The "bodily injury" or "property damage" is caused by an "occurrence" that takes place in the "coverage territory";
- (2) The "bodily injury" or "property damage" occurs during the policy period; and
- (3) Prior to the policy period, no insured listed under Paragraph 1. of Section II – Who Is An Insured and no "employee" authorized by you to give or receive notice of an "occurrence" or claim, knew that the "bodily injury" or "property damage" had occurred, in whole or in part. If such a listed insured or authorized "employee" knew, prior to the policy period, that the "bodily injury" or "property damage" occurred, then any continuation, change or resumption of such "bodily injury" or "property damage" during or after the policy period will be deemed to have been known prior to the policy period.

- c. "Bodily injury" or "property damage" which occurs during the policy period and was not, prior to the policy period, known to have occurred by any insured listed under Paragraph 1. of Section II – Who Is An Insured or any "employee" authorized by you to give or receive notice of an "occurrence" or claim, includes any continuation, change or resumption of that "bodily injury" or "property damage" after the end of the policy period.

- d. "Bodily injury" or "property damage" will be deemed to have been known to have occurred at the earliest time when any insured listed under Paragraph 1. of Section II – Who Is An Insured or any "employee" authorized by you to give or receive notice of an "occurrence" or claim:

- (1) Reports all, or any part, of the "bodily injury" or "property damage" to us or any other insurer;
- (2) Receives a written or verbal demand or claim for damages because of the "bodily injury" or "property damage"; or
- (3) Becomes aware by any other means that "bodily injury" or "property damage" has occurred or has begun to occur.

- e. Damages because of "bodily injury" include damages claimed by any person or organization for care, loss of services or death resulting at any time from the "bodily injury".

## 2. Exclusions

This insurance does not apply to:

### a. Expected Or Intended Injury

"Bodily injury" or "property damage" expected or intended from the standpoint of the insured. This exclusion does not apply to "bodily injury" resulting from the use of reasonable force to protect persons or property.

### b. Contractual Liability

"Bodily injury" or "property damage" for which the insured is obligated to pay damages by reason of the assumption of liability in a contract or agreement. This exclusion does not apply to liability for damages:

- (1) That the insured would have in the absence of the contract or agreement; or
- (2) Assumed in a contract or agreement that is an "insured contract", provided the "bodily injury" or "property damage" occurs subsequent to the execution of the contract or agreement. Solely for the purposes of liability assumed in an "insured contract", reasonable attorney fees and necessary litigation expenses incurred by or for a party other than an insured are deemed to be damages because of "bodily injury" or "property damage", provided:
  - (a) Liability to such party for, or for the cost of, that party's defense has also been assumed in the same "insured contract"; and
  - (b) Such attorney fees and litigation expenses are for defense of that party against a civil or alternative dispute resolution proceeding in which damages to which this insurance applies are alleged.

### c. Liquor Liability

"Bodily injury" or "property damage" for which any insured may be held liable by reason of:

- (1) Causing or contributing to the intoxication of any person;
- (2) The furnishing of alcoholic beverages to a person under the legal drinking age or under the influence of alcohol; or
- (3) Any statute, ordinance or regulation relating to the sale, gift, distribution or use of alcoholic beverages.

This exclusion applies only if you are in the business of manufacturing, distributing, selling, serving or furnishing alcoholic beverages.

### d. Workers' Compensation And Similar Laws

Any obligation of the insured under a workers' compensation, disability benefits or unemployment compensation law or any similar law.

### e. Employer's Liability

"Bodily injury" to:

- (1) An "employee" of the insured arising out of and in the course of:
  - (a) Employment by the insured; or
  - (b) Performing duties related to the conduct of the insured's business; or
- (2) The spouse, child, parent, brother or sister of that "employee" as a consequence of Paragraph (1) above.

This exclusion applies:

- (1) Whether the insured may be liable as an employer or in any other capacity; and
- (2) To any obligation to share damages with or repay someone else who must pay damages because of the injury.

This exclusion does not apply to liability assumed by the insured under an "insured contract".

**f. Pollution**

- (1) "Bodily injury" or "property damage" arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release or escape of "pollutants":
- (a) At or from any premises, site or location which is or was at any time owned or occupied by, or rented or loaned to, any insured. However, this subparagraph does not apply to:
    - (i) "Bodily injury" if sustained within a building and caused by smoke, fumes, vapor or soot produced by or originating from equipment that is used to heat, cool or dehumidify the building, or equipment that is used to heat water for personal use, by the building's occupants or their guests;
    - (ii) "Bodily injury" or "property damage" for which you may be held liable, if you are a contractor and the owner or lessee of such premises, site or location has been added to your policy as an additional insured with respect to your ongoing operations performed for that additional insured at that premises, site or location and such premises, site or location is not and never was owned or occupied by, or rented or loaned to, any insured, other than that additional insured; or
    - (iii) "Bodily injury" or "property damage" arising out of heat, smoke or fumes from a "hostile fire";
  - (b) At or from any premises, site or location which is or was at any time used by or for any insured or others for the handling, storage, disposal, processing or treatment of waste;
  - (c) Which are or were at any time transported, handled, stored, treated, disposed of, or processed as waste by or for:
    - (i) Any insured; or
    - (ii) Any person or organization for whom you may be legally responsible; or
  - (d) At or from any premises, site or location on which any insured or any contractors or subcontractors working directly or indirectly on any insured's behalf are performing operations if the "pollutants" are brought on or to the premises, site or location in connection with such operations by such insured, contractor or subcontractor. However, this subparagraph does not apply to:
    - (i) "Bodily injury" or "property damage" arising out of the escape of fuels, lubricants or other operating fluids which are needed to perform the normal electrical, hydraulic or mechanical functions necessary for the operation of "mobile equipment" or its parts, if such fuels, lubricants or other operating fluids escape from a vehicle part designed to hold, store or receive them. This exception does not apply if the "bodily injury" or "property damage" arises out of the intentional discharge, dispersal or release of the fuels, lubricants or other operating fluids, or if such fuels, lubricants or other operating fluids are brought on or to the premises, site or location with the intent that they be discharged, dispersed or released as part of the operations being performed by such insured, contractor or subcontractor;
    - (ii) "Bodily injury" or "property damage" sustained within a building and caused by the release of gases, fumes or vapors from materials brought into that building in connection with operations being performed by you or on your behalf by a contractor or subcontractor; or
    - (iii) "Bodily injury" or "property damage" arising out of heat, smoke or fumes from a "hostile fire".
  - (e) At or from any premises, site or location on which any insured or any contractors or subcontractors working directly or indirectly on any insured's behalf are performing operations if the operations are to test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of, "pollutants".

(2) Any loss, cost or expense arising out of any:

- (a) Request, demand, order or statutory or regulatory requirement that any insured or others test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of, "pollutants"; or
- (b) Claim or "suit" by or on behalf of a governmental authority for damages because of testing for, monitoring, cleaning up, removing, containing, treating, detoxifying or neutralizing, or in any way responding to, or assessing the effects of, "pollutants".

However, this paragraph does not apply to liability for damages because of "property damage" that the insured would have in the absence of such request, demand, order or statutory or regulatory requirement, or such claim or "suit" by or on behalf of a governmental authority.

**g. Aircraft, Auto Or Watercraft**

"Bodily injury" or "property damage" arising out of the ownership, maintenance, use or entrustment to others of any aircraft, "auto" or watercraft owned or operated by or rented or loaned to any insured. Use includes operation and "loading or unloading".

This exclusion applies even if the claims against any insured allege negligence or other wrongdoing in the supervision, hiring, employment, training or monitoring of others by that insured, if the "occurrence" which caused the "bodily injury" or "property damage" involved the ownership, maintenance, use or entrustment to others of any aircraft, "auto" or watercraft that is owned or operated by or rented or loaned to any insured.

This exclusion does not apply to:

- (1) A watercraft while ashore on premises you own or rent;
- (2) A watercraft you do not own that is:
  - (a) Less than 26 feet long; and
  - (b) Not being used to carry persons or property for a charge;
- (3) Parking an "auto" on, or on the ways next to, premises you own or rent, provided the "auto" is not owned by or rented or loaned to you or the insured;
- (4) Liability assumed under any "insured contract" for the ownership, maintenance or use of aircraft or watercraft; or

(5) "Bodily injury" or "property damage" arising out of:

- (a) The operation of machinery or equipment that is attached to, or part of, a land vehicle that would qualify under the definition of "mobile equipment" if it were not subject to a compulsory or financial responsibility law or other motor vehicle insurance law in the state where it is licensed or principally garaged; or
- (b) the operation of any of the machinery or equipment listed in Paragraph **f.(2)** or **f.(3)** of the definition of "mobile equipment".

**h. Mobile Equipment**

"Bodily injury" or "property damage" arising out of:

- (1) The transportation of "mobile equipment" by an "auto" owned or operated by or rented or loaned to any insured; or
- (2) The use of "mobile equipment" in, or while in practice for, or while being prepared for, any prearranged racing, speed, demolition, or stunting activity.

**i. War**

"Bodily injury" or "property damage", however caused, arising, directly or indirectly, out of:

- (1) War, including undeclared or civil war;
- (2) Warlike action by a military force, including action in hindering or defending against an actual or expected attack, by any government, sovereign or other authority using military personnel or other agents; or
- (3) Insurrection, rebellion, revolution, usurped power, or action taken by governmental authority in hindering or defending against any of these.

**j. Damage To Property**

"Property damage" to:

- (1) Property you own, rent, or occupy, including any costs or expenses incurred by you, or any other person, organization or entity, for repair, replacement, enhancement, restoration or maintenance of such property for any reason, including prevention of injury to a person or damage to another's property;
- (2) Premises you sell, give away or abandon, if the "property damage" arises out of any part of those premises;
- (3) Property loaned to you;
- (4) Personal property in the care, custody or control of the insured;

(5) That particular part of real property on which you or any contractors or subcontractors working directly or indirectly on your behalf are performing operations, if the "property damage" arises out of those operations; or

(6) That particular part of any property that must be restored, repaired or replaced because "your work" was incorrectly performed on it.

Paragraphs (1), (3) and (4) of this exclusion do not apply to "property damage" (other than damage by fire) to premises, including the contents of such premises, rented to you for a period of 7 or fewer consecutive days. A separate limit of insurance applies to Damage To Premises Rented To You as described in Section III – Limits Of Insurance.

Paragraph (2) of this exclusion does not apply if the premises are "your work" and were never occupied, rented or held for rental by you.

Paragraphs (3), (4), (5) and (6) of this exclusion do not apply to liability assumed under a side-track agreement.

Paragraph (6) of this exclusion does not apply to "property damage" included in the "products-completed operations hazard".

**k. Damage To Your Product**

"Property damage" to "your product" arising out of it or any part of it.

**l. Damage To Your Work**

"Property damage" to "your work" arising out of it or any part of it and included in the "products-completed operations hazard".

This exclusion does not apply if the damaged work or the work out of which the damage arises was performed on your behalf by a subcontractor.

**m. Damage To Impaired Property Or Property Not Physically Injured**

"Property damage" to "impaired property" or property that has not been physically injured, arising out of:

- (1) A defect, deficiency, inadequacy or dangerous condition in "your product" or "your work"; or
- (2) A delay or failure by you or anyone acting on your behalf to perform a contract or agreement in accordance with its terms.

This exclusion does not apply to the loss of use of other property arising out of sudden and accidental physical injury to "your product" or "your work" after it has been put to its intended use.

**n. Recall Of Products, Work Or Impaired Property**

Damages claimed for any loss, cost or expense incurred by you or others for the loss of use, withdrawal, recall, inspection, repair, replacement, adjustment, removal or disposal of:

- (1) "Your product";
- (2) "Your work"; or
- (3) "Impaired property";

if such product, work, or property is withdrawn or recalled from the market or from use by any person or organization because of a known or suspected defect, deficiency, inadequacy or dangerous condition in it.

**o. Personal And Advertising Injury**

"Bodily injury" arising out of "personal and advertising injury".

**p. Electronic Data**

Damages arising out of the loss of, loss of use of, damage to, corruption of, inability to access, or inability to manipulate electronic data.

As used in this exclusion, electronic data means information, facts or programs stored as or on, created or used on, or transmitted to or from computer software, including systems and applications software, hard or floppy disks, CD-ROMS, tapes, drives, cells, data processing devices or any other media which are used with electronically controlled equipment.

Exclusions c. through n. do not apply to damage by fire to premises while rented to you or temporarily occupied by you with permission of the owner. A separate limit of insurance applies to this coverage as described in Section III – Limits Of Insurance.

**COVERAGE B PERSONAL AND ADVERTISING INJURY LIABILITY**

**1. Insuring Agreement**

a. We will pay those sums that the insured becomes legally obligated to pay as damages because of "personal and advertising injury" to which this insurance applies. We will have the right and duty to defend the insured against any "suit" seeking those damages. However, we will have no duty to defend the insured against any "suit" seeking damages for "personal and advertising injury" to which this insurance does not apply. We may, at our discretion, investigate any offense and settle any claim or "suit" that may result. But:

- (1) The amount we will pay for damages is limited as described in Section III – Limits Of Insurance; and

- (2) Our right and duty to defend end when we have used up the applicable limit of insurance in the payment of judgments or settlements under Coverages **A** or **B** or medical expenses under Coverage **C**.

No other obligation or liability to pay sums or perform acts or services is covered unless explicitly provided for under Supplementary Payments – Coverages **A** and **B**.

- b. This insurance applies to "personal and advertising injury" caused by an offense arising out of your business but only if the offense was committed in the "coverage territory" during the policy period.

## **2. Exclusions**

This insurance does not apply to:

### **a. Knowing Violation Of Rights Of Another**

"Personal and advertising injury" caused by or at the direction of the insured with the knowledge that the act would violate the rights of another and would inflict "personal and advertising injury".

### **b. Material Published With Knowledge Of Falsity**

"Personal and advertising injury" arising out of oral or written publication of material, if done by or at the direction of the insured with knowledge of its falsity.

### **c. Material Published Prior To Policy Period**

"Personal and advertising injury" arising out of oral or written publication of material whose first publication took place before the beginning of the policy period.

### **d. Criminal Acts**

"Personal and advertising injury" arising out of a criminal act committed by or at the direction of the insured.

### **e. Contractual Liability**

"Personal and advertising injury" for which the insured has assumed liability in a contract or agreement. This exclusion does not apply to liability for damages that the insured would have in the absence of the contract or agreement.

### **f. Breach Of Contract**

"Personal and advertising injury" arising out of a breach of contract, except an implied contract to use another's advertising idea in your "advertisement".

### **g. Quality Or Performance Of Goods – Failure To Conform To Statements**

"Personal and advertising injury" arising out of the failure of goods, products or services to conform with any statement of quality or performance made in your "advertisement".

### **h. Wrong Description Of Prices**

"Personal and advertising injury" arising out of the wrong description of the price of goods, products or services stated in your "advertisement".

### **i. Infringement Of Copyright, Patent, Trademark Or Trade Secret**

"Personal and advertising injury" arising out of the infringement of copyright, patent, trademark, trade secret or other intellectual property rights.

However, this exclusion does not apply to infringement, in your "advertisement", of copyright, trade dress or slogan.

### **j. Insureds In Media And Internet Type Businesses**

"Personal and advertising injury" committed by an insured whose business is:

- (1) Advertising, broadcasting, publishing or telecasting;
- (2) Designing or determining content of websites for others; or
- (3) An Internet search, access, content or service provider.

However, this exclusion does not apply to Paragraphs **14.a.**, **b.** and **c.** of "personal and advertising injury" under the Definitions Section.

For the purposes of this exclusion, the placing of frames, borders or links, or advertising, for you or others anywhere on the Internet, is not by itself, considered the business of advertising, broadcasting, publishing or telecasting.

### **k. Electronic Chatrooms Or Bulletin Boards**

"Personal and advertising injury" arising out of an electronic chatroom or bulletin board the insured hosts, owns, or over which the insured exercises control.

### **l. Unauthorized Use Of Another's Name Or Product**

"Personal and advertising injury" arising out of the unauthorized use of another's name or product in your e-mail address, domain name or metatag, or any other similar tactics to mislead another's potential customers.

**m. Pollution**

"Personal and advertising injury" arising out of the actual, alleged or threatened discharge, dispersal, seepage, migration, release or escape of "pollutants" at any time.

**n. Pollution-Related**

Any loss, cost or expense arising out of any:

- (1) Request, demand, order or statutory or regulatory requirement that any insured or others test for, monitor, clean up, remove, contain, treat, detoxify or neutralize, or in any way respond to, or assess the effects of, "pollutants"; or
- (2) Claim or suit by or on behalf of a governmental authority for damages because of testing for, monitoring, cleaning up, removing, containing, treating, detoxifying or neutralizing, or in any way responding to, or assessing the effects of, "pollutants".

**o. War**

"Personal and advertising injury", however caused, arising, directly or indirectly, out of:

- (1) War, including undeclared or civil war;
- (2) Warlike action by a military force, including action in hindering or defending against an actual or expected attack, by any government, sovereign or other authority using military personnel or other agents; or
- (3) Insurrection, rebellion, revolution, usurped power, or action taken by governmental authority in hindering or defending against any of these.

**COVERAGE C MEDICAL PAYMENTS**

**1. Insuring Agreement**

- a. We will pay medical expenses as described below for "bodily injury" caused by an accident:

- (1) On premises you own or rent;
- (2) On ways next to premises you own or rent; or
- (3) Because of your operations; provided that:
  - (1) The accident takes place in the "coverage territory" and during the policy period;
  - (2) The expenses are incurred and reported to us within one year of the date of the accident; and
  - (3) The injured person submits to examination, at our expense, by physicians of our choice as often as we reasonably require.

- b. We will make these payments regardless of fault. These payments will not exceed the applicable limit of insurance. We will pay reasonable expenses for:

- (1) First aid administered at the time of an accident;
- (2) Necessary medical, surgical, x-ray and dental services, including prosthetic devices; and
- (3) Necessary ambulance, hospital, professional nursing and funeral services.

**2. Exclusions**

We will not pay expenses for "bodily injury":

**a. Any Insured**

To any insured, except "volunteer workers".

**b. Hired Person**

To a person hired to do work for or on behalf of any insured or a tenant of any insured.

**c. Injury On Normally Occupied Premises**

To a person injured on that part of premises you own or rent that the person normally occupies.

**d. Workers Compensation And Similar Laws**

To a person, whether or not an "employee" of any insured, if benefits for the "bodily injury" are payable or must be provided under a workers' compensation or disability benefits law or a similar law.

**e. Athletics Activities**

To a person injured while practicing, instructing or participating in any physical exercises or games, sports, or athletic contests.

**f. Products-Completed Operations Hazard**

Included within the "products-completed operations hazard".

**g. Coverage A Exclusions**

Excluded under Coverage A.

**SUPPLEMENTARY PAYMENTS – COVERAGES A AND B**

1. We will pay, with respect to any claim we investigate or settle, or any "suit" against an insured we defend:

- a. All expenses we incur.
- b. Up to \$250 for cost of bail bonds required because of accidents or traffic law violations arising out of the use of any vehicle to which the Bodily Injury Liability Coverage applies. We do not have to furnish these bonds.

- c. The cost of bonds to release attachments, but only for bond amounts within the applicable limit of insurance. We do not have to furnish these bonds.
- d. All reasonable expenses incurred by the insured at our request to assist us in the investigation or defense of the claim or "suit", including actual loss of earnings up to \$250 a day because of time off from work.
- e. All costs taxed against the insured in the "suit".
- f. Prejudgment interest awarded against the insured on that part of the judgment we pay. If we make an offer to pay the applicable limit of insurance, we will not pay any prejudgment interest based on that period of time after the offer.
- g. All interest on the full amount of any judgment that accrues after entry of the judgment and before we have paid, offered to pay, or deposited in court the part of the judgment that is within the applicable limit of insurance.

These payments will not reduce the limits of insurance.

- 2. If we defend an insured against a "suit" and an indemnitee of the insured is also named as a party to the "suit", we will defend that indemnitee if all of the following conditions are met:
  - a. The "suit" against the indemnitee seeks damages for which the insured has assumed the liability of the indemnitee in a contract or agreement that is an "insured contract";
  - b. This insurance applies to such liability assumed by the insured;
  - c. The obligation to defend, or the cost of the defense of, that indemnitee, has also been assumed by the insured in the same "insured contract";
  - d. The allegations in the "suit" and the information we know about the "occurrence" are such that no conflict appears to exist between the interests of the insured and the interests of the indemnitee;
  - e. The indemnitee and the insured ask us to conduct and control the defense of that indemnitee against such "suit" and agree that we can assign the same counsel to defend the insured and the indemnitee; and
  - f. The indemnitee:
    - (1) Agrees in writing to:
      - (a) Cooperate with us in the investigation, settlement or defense of the "suit";

- (b) Immediately send us copies of any demands, notices, summonses or legal papers received in connection with the "suit";
  - (c) Notify any other insurer whose coverage is available to the indemnitee; and
  - (d) Cooperate with us with respect to coordinating other applicable insurance available to the indemnitee; and
- (2) Provides us with written authorization to:
    - (a) Obtain records and other information related to the "suit"; and
    - (b) Conduct and control the defense of the indemnitee in such "suit".

So long as the above conditions are met, attorneys' fees incurred by us in the defense of that indemnitee, necessary litigation expenses incurred by us and necessary litigation expenses incurred by the indemnitee at our request will be paid as Supplementary Payments. Notwithstanding the provisions of Paragraph **2.b.(2)** of Section **I – Coverage A – Bodily Injury And Property Damage Liability**, such payments will not be deemed to be damages for "bodily injury" and "property damage" and will not reduce the limits of insurance.

Our obligation to defend an insured's indemnitee and to pay for attorneys' fees and necessary litigation expenses as Supplementary Payments ends when:

- a. We have used up the applicable limit of insurance in the payment of judgments or settlements; or
- b. The conditions set forth above, or the terms of the agreement described in Paragraph **f.** above, are no longer met.

## SECTION II – WHO IS AN INSURED

- 1. If you are designated in the Declarations as:
  - a. An individual, you and your spouse are insureds, but only with respect to the conduct of a business of which you are the sole owner.
  - b. A partnership or joint venture, you are an insured. Your members, your partners, and their spouses are also insureds, but only with respect to the conduct of your business.
  - c. A limited liability company, you are an insured. Your members are also insureds, but only with respect to the conduct of your business. Your managers are insureds, but only with respect to their duties as your managers.

- d. An organization other than a partnership, joint venture or limited liability company, you are an insured. Your "executive officers" and directors are insureds, but only with respect to their duties as your officers or directors. Your stockholders are also insureds, but only with respect to their liability as stockholders.
  - e. A trust, you are an insured. Your trustees are also insureds, but only with respect to their duties as trustees.
2. Each of the following is also an insured:
- a. Your "volunteer workers" only while performing duties related to the conduct of your business, or your "employees", other than either your "executive officers" (if you are an organization other than a partnership, joint venture or limited liability company) or your managers (if you are a limited liability company), but only for acts within the scope of their employment by you or while performing duties related to the conduct of your business. However, none of these "employees" or "volunteer workers" are insureds for:
    - (1) "Bodily injury" or "personal and advertising injury":
      - (a) To you, to your partners or members (if you are a partnership or joint venture), to your members (if you are a limited liability company), to a co-"employee" while in the course of his or her employment or performing duties related to the conduct of your business, or to your other "volunteer workers" while performing duties related to the conduct of your business;
      - (b) To the spouse, child, parent, brother or sister of that co-"employee" or "volunteer worker" as a consequence of Paragraph (1)(a) above;
      - (c) For which there is any obligation to share damages with or repay someone else who must pay damages because of the injury described in Paragraphs (1)(a) or (b) above; or
      - (d) Arising out of his or her providing or failing to provide professional health care services.
    - (2) "Property damage" to property:
      - (a) Owned, occupied or used by,
        - (b) Rented to, in the care, custody or control of, or over which physical control is being exercised for any purpose by you, any of your "employees", "volunteer workers", any partner or member (if you are a partnership or joint venture), or any member (if you are a limited liability company).
  - b. Any person (other than your "employee" or "volunteer worker"), or any organization while acting as your real estate manager.
  - c. Any person or organization having proper temporary custody of your property if you die, but only:
    - (1) With respect to liability arising out of the maintenance or use of that property; and
    - (2) Until your legal representative has been appointed.
  - d. Your legal representative if you die, but only with respect to duties as such. That representative will have all your rights and duties under this Coverage Part.
3. Any organization you newly acquire or form, other than a partnership, joint venture or limited liability company, and over which you maintain ownership or majority interest, will qualify as a Named Insured if there is no other similar insurance available to that organization. However:
- a. Coverage under this provision is afforded only until the 90th day after you acquire or form the organization or the end of the policy period, whichever is earlier;
  - b. Coverage **A** does not apply to "bodily injury" or "property damage" that occurred before you acquired or formed the organization; and
  - c. Coverage **B** does not apply to "personal and advertising injury" arising out of an offense committed before you acquired or formed the organization.
- No person or organization is an insured with respect to the conduct of any current or past partnership, joint venture or limited liability company that is not shown as a Named Insured in the Declarations.

### SECTION III – LIMITS OF INSURANCE

- 1. The Limits of Insurance shown in the Declarations and the rules below fix the most we will pay regardless of the number of:
  - a. Insureds;
  - b. Claims made or "suits" brought; or
  - c. Persons or organizations making claims or bringing "suits".

2. The General Aggregate Limit is the most we will pay for the sum of:
  - a. Medical expenses under Coverage **C**;
  - b. Damages under Coverage **A**, except damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard"; and
  - c. Damages under Coverage **B**.
3. The Products-Completed Operations Aggregate Limit is the most we will pay under Coverage **A** for damages because of "bodily injury" and "property damage" included in the "products-completed operations hazard".
4. Subject to 2. above, the Personal and Advertising Injury Limit is the most we will pay under Coverage **B** for the sum of all damages because of all "personal and advertising injury" sustained by any one person or organization.
5. Subject to 2. or 3. above, whichever applies, the Each Occurrence Limit is the most we will pay for the sum of:
  - a. Damages under Coverage **A**; and
  - b. Medical expenses under Coverage **C** because of all "bodily injury" and "property damage" arising out of any one "occurrence".
6. Subject to 5. above, the Damage To Premises Rented To You Limit is the most we will pay under Coverage **A** for damages because of "property damage" to any one premises, while rented to you, or in the case of damage by fire, while rented to you or temporarily occupied by you with permission of the owner.
7. Subject to 5. above, the Medical Expense Limit is the most we will pay under Coverage **C** for all medical expenses because of "bodily injury" sustained by any one person.

The Limits of Insurance of this Coverage Part apply separately to each consecutive annual period and to any remaining period of less than 12 months, starting with the beginning of the policy period shown in the Declarations, unless the policy period is extended after issuance for an additional period of less than 12 months. In that case, the additional period will be deemed part of the last preceding period for purposes of determining the Limits of Insurance.

#### **SECTION IV – COMMERCIAL GENERAL LIABILITY CONDITIONS**

##### **1. Bankruptcy**

Bankruptcy or insolvency of the insured or of the insured's estate will not relieve us of our obligations under this Coverage Part.

##### **2. Duties In The Event Of Occurrence, Offense, Claim Or Suit**

- a. You must see to it that we are notified as soon as practicable of an "occurrence" or an offense which may result in a claim. To the extent possible, notice should include:
  - (1) How, when and where the "occurrence" or offense took place;
  - (2) The names and addresses of any injured persons and witnesses; and
  - (3) The nature and location of any injury or damage arising out of the "occurrence" or offense.
- b. If a claim is made or "suit" is brought against any insured, you must:
  - (1) Immediately record the specifics of the claim or "suit" and the date received; and
  - (2) Notify us as soon as practicable.

You must see to it that we receive written notice of the claim or "suit" as soon as practicable.
- c. You and any other involved insured must:
  - (1) Immediately send us copies of any demands, notices, summonses or legal papers received in connection with the claim or "suit";
  - (2) Authorize us to obtain records and other information;
  - (3) Cooperate with us in the investigation or settlement of the claim or defense against the "suit"; and
  - (4) Assist us, upon our request, in the enforcement of any right against any person or organization which may be liable to the insured because of injury or damage to which this insurance may also apply.
- d. No insured will, except at that insured's own cost, voluntarily make a payment, assume any obligation, or incur any expense, other than for first aid, without our consent.

##### **3. Legal Action Against Us**

No person or organization has a right under this Coverage Part:

- a. To join us as a party or otherwise bring us into a "suit" asking for damages from an insured; or

- b.** To sue us on this Coverage Part unless all of its terms have been fully complied with.

A person or organization may sue us to recover on an agreed settlement or on a final judgment against an insured; but we will not be liable for damages that are not payable under the terms of this Coverage Part or that are in excess of the applicable limit of insurance. An agreed settlement means a settlement and release of liability signed by us, the insured and the claimant or the claimant's legal representative.

#### **4. Other Insurance**

If other valid and collectible insurance is available to the insured for a loss we cover under Coverages **A** or **B** of this Coverage Part, our obligations are limited as follows:

##### **a. Primary Insurance**

This insurance is primary except when **b.** below applies. If this insurance is primary, our obligations are not affected unless any of the other insurance is also primary. Then, we will share with all that other insurance by the method described in **c.** below.

##### **b. Excess Insurance**

This insurance is excess over:

- (1)** Any of the other insurance, whether primary, excess, contingent or on any other basis:
  - (a)** That is Fire, Extended Coverage, Builder's Risk, Installation Risk or similar coverage for "your work";
  - (b)** That is Fire insurance for premises rented to you or temporarily occupied by you with permission of the owner;
  - (c)** That is insurance purchased by you to cover your liability as a tenant for "property damage" to premises rented to you or temporarily occupied by you with permission of the owner; or
  - (d)** If the loss arises out of the maintenance or use of aircraft, "autos" or watercraft to the extent not subject to Exclusion **g.** of Section **I** – Coverage **A** – Bodily Injury And Property Damage Liability.
- (2)** Any other primary insurance available to you covering liability for damages arising out of the premises or operations, or the products and completed operations, for which you have been added as an additional insured by attachment of an endorsement.

When this insurance is excess, we will have no duty under Coverages **A** or **B** to defend the insured against any "suit" if any other insurer has a duty to defend the insured against that "suit". If no other insurer defends, we will undertake to do so, but we will be entitled to the insured's rights against all those other insurers.

When this insurance is excess over other insurance, we will pay only our share of the amount of the loss, if any, that exceeds the sum of:

- (1)** The total amount that all such other insurance would pay for the loss in the absence of this insurance; and
- (2)** The total of all deductible and self-insured amounts under all that other insurance.

We will share the remaining loss, if any, with any other insurance that is not described in this Excess Insurance provision and was not bought specifically to apply in excess of the Limits of Insurance shown in the Declarations of this Coverage Part.

##### **c. Method Of Sharing**

If all of the other insurance permits contribution by equal shares, we will follow this method also. Under this approach each insurer contributes equal amounts until it has paid its applicable limit of insurance or none of the loss remains, whichever comes first.

If any of the other insurance does not permit contribution by equal shares, we will contribute by limits. Under this method, each insurer's share is based on the ratio of its applicable limit of insurance to the total applicable limits of insurance of all insurers.

#### **5. Premium Audit**

- a.** We will compute all premiums for this Coverage Part in accordance with our rules and rates.
- b.** Premium shown in this Coverage Part as advance premium is a deposit premium only. At the close of each audit period we will compute the earned premium for that period and send notice to the first Named Insured. The due date for audit and retrospective premiums is the date shown as the due date on the bill. If the sum of the advance and audit premiums paid for the policy period is greater than the earned premium, we will return the excess to the first Named Insured.
- c.** The first Named Insured must keep records of the information we need for premium computation, and send us copies at such times as we may request.

## 6. Representations

By accepting this policy, you agree:

- a. The statements in the Declarations are accurate and complete;
- b. Those statements are based upon representations you made to us; and
- c. We have issued this policy in reliance upon your representations.

## 7. Separation Of Insureds

Except with respect to the Limits of Insurance, and any rights or duties specifically assigned in this Coverage Part to the first Named Insured, this insurance applies:

- a. As if each Named Insured were the only Named Insured; and
- b. Separately to each insured against whom claim is made or "suit" is brought.

## 8. Transfer Of Rights Of Recovery Against Others To Us

If the insured has rights to recover all or part of any payment we have made under this Coverage Part, those rights are transferred to us. The insured must do nothing after loss to impair them. At our request, the insured will bring "suit" or transfer those rights to us and help us enforce them.

## 9. When We Do Not Renew

If we decide not to renew this Coverage Part, we will mail or deliver to the first Named Insured shown in the Declarations written notice of the non-renewal not less than 30 days before the expiration date.

If notice is mailed, proof of mailing will be sufficient proof of notice.

## SECTION V – DEFINITIONS

1. "Advertisement" means a notice that is broadcast or published to the general public or specific market segments about your goods, products or services for the purpose of attracting customers or supporters. For the purposes of this definition:
  - a. Notices that are published include material placed on the Internet or on similar electronic means of communication; and
  - b. Regarding web-sites, only that part of a web-site that is about your goods, products or services for the purposes of attracting customers or supporters is considered an advertisement.
2. "Auto" means:
  - a. A land motor vehicle, trailer or semitrailer designed for travel on public roads, including any attached machinery or equipment; or

- b. Any other land vehicle that is subject to a compulsory or financial responsibility law or other motor vehicle insurance law in the state where it is licensed or principally garaged.

However, "auto" does not include "mobile equipment".

3. "Bodily injury" means bodily injury, sickness or disease sustained by a person, including death resulting from any of these at any time.

4. "Coverage territory" means:

- a. The United States of America (including its territories and possessions), Puerto Rico and Canada;
- b. International waters or airspace, but only if the injury or damage occurs in the course of travel or transportation between any places included in a. above; or
- c. All other parts of the world if the injury or damage arises out of:

- (1) Goods or products made or sold by you in the territory described in a. above;
- (2) The activities of a person whose home is in the territory described in a. above, but is away for a short time on your business; or
- (3) "Personal and advertising injury" offenses that take place through the Internet or similar electronic means of communication

provided the insured's responsibility to pay damages is determined in a "suit" on the merits, in the territory described in a. above or in a settlement we agree to.

5. "Employee" includes a "leased worker". "Employee" does not include a "temporary worker".
6. "Executive officer" means a person holding any of the officer positions created by your charter, constitution, by-laws or any other similar governing document.
7. "Hostile fire" means one which becomes uncontrollable or breaks out from where it was intended to be.
8. "Impaired property" means tangible property, other than "your product" or "your work", that cannot be used or is less useful because:

- a. It incorporates "your product" or "your work" that is known or thought to be defective, deficient, inadequate or dangerous; or
- b. You have failed to fulfill the terms of a contract or agreement;

if such property can be restored to use by:

- a. The repair, replacement, adjustment or removal of "your product" or "your work"; or

- b. Your fulfilling the terms of the contract or agreement.

9. "Insured contract" means:

- a. A contract for a lease of premises. However, that portion of the contract for a lease of premises that indemnifies any person or organization for damage by fire to premises while rented to you or temporarily occupied by you with permission of the owner is not an "insured contract";
- b. A sidetrack agreement;
- c. Any easement or license agreement, except in connection with construction or demolition operations on or within 50 feet of a railroad;
- d. An obligation, as required by ordinance, to indemnify a municipality, except in connection with work for a municipality;
- e. An elevator maintenance agreement;
- f. That part of any other contract or agreement pertaining to your business (including an indemnification of a municipality in connection with work performed for a municipality) under which you assume the tort liability of another party to pay for "bodily injury" or "property damage" to a third person or organization. Tort liability means a liability that would be imposed by law in the absence of any contract or agreement.

Paragraph f. does not include that part of any contract or agreement:

- (1) That indemnifies a railroad for "bodily injury" or "property damage" arising out of construction or demolition operations, within 50 feet of any railroad property and affecting any railroad bridge or trestle, tracks, roadbeds, tunnel, underpass or crossing;
- (2) That indemnifies an architect, engineer or surveyor for injury or damage arising out of:
  - (a) Preparing, approving, or failing to prepare or approve, maps, shop drawings, opinions, reports, surveys, field orders, change orders or drawings and specifications; or
  - (b) Giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage; or
- (3) Under which the insured, if an architect, engineer or surveyor, assumes liability for an injury or damage arising out of the insured's rendering or failure to render professional services, including those listed in (2) above and supervisory, inspection, architectural or engineering activities.

10. "Leased worker" means a person leased to you by a labor leasing firm under an agreement between you and the labor leasing firm, to perform duties related to the conduct of your business. "Leased worker" does not include a "temporary worker".

11. "Loading or unloading" means the handling of property:

- a. After it is moved from the place where it is accepted for movement into or onto an aircraft, watercraft or "auto";
- b. While it is in or on an aircraft, watercraft or "auto"; or
- c. While it is being moved from an aircraft, watercraft or "auto" to the place where it is finally delivered;

but "loading or unloading" does not include the movement of property by means of a mechanical device, other than a hand truck, that is not attached to the aircraft, watercraft or "auto".

12. "Mobile equipment" means any of the following types of land vehicles, including any attached machinery or equipment:

- a. Bulldozers, farm machinery, forklifts and other vehicles designed for use principally off public roads;
- b. Vehicles maintained for use solely on or next to premises you own or rent;
- c. Vehicles that travel on crawler treads;
- d. Vehicles, whether self-propelled or not, maintained primarily to provide mobility to permanently mounted:
  - (1) Power cranes, shovels, loaders, diggers or drills; or
  - (2) Road construction or resurfacing equipment such as graders, scrapers or rollers;
- e. Vehicles not described in a., b., c. or d. above that are not self-propelled and are maintained primarily to provide mobility to permanently attached equipment of the following types:
  - (1) Air compressors, pumps and generators, including spraying, welding, building cleaning, geophysical exploration, lighting and well servicing equipment; or
  - (2) Cherry pickers and similar devices used to raise or lower workers;
- f. Vehicles not described in a., b., c. or d. above maintained primarily for purposes other than the transportation of persons or cargo.

However, self-propelled vehicles with the following types of permanently attached equipment are not "mobile equipment" but will be considered "autos":

- (1) Equipment designed primarily for:
  - (a) Snow removal;
  - (b) Road maintenance, but not construction or resurfacing; or
  - (c) Street cleaning;
- (2) Cherry pickers and similar devices mounted on automobile or truck chassis and used to raise or lower workers; and
- (3) Air compressors, pumps and generators, including spraying, welding, building cleaning, geophysical exploration, lighting and well servicing equipment.

However, "mobile equipment" does not include any land vehicles that are subject to a compulsory or financial responsibility law or other motor vehicle insurance law in the state where it is licensed or principally garaged. Land vehicles subject to a compulsory or financial responsibility law or other motor vehicle insurance law are considered "autos".

13. "Occurrence" means an accident, including continuous or repeated exposure to substantially the same general harmful conditions.
14. "Personal and advertising injury" means injury, including consequential "bodily injury", arising out of one or more of the following offenses:
  - a. False arrest, detention or imprisonment;
  - b. Malicious prosecution;
  - c. The wrongful eviction from, wrongful entry into, or invasion of the right of private occupancy of a room, dwelling or premises that a person occupies, committed by or on behalf of its owner, landlord or lessor;
  - d. Oral or written publication, in any manner, of material that slanders or libels a person or organization or disparages a person's or organization's goods, products or services;
  - e. Oral or written publication, in any manner, of material that violates a person's right of privacy;
  - f. The use of another's advertising idea in your "advertisement"; or
  - g. Infringing upon another's copyright, trade dress or slogan in your "advertisement".

15. "Pollutants" mean any solid, liquid, gaseous or thermal irritant or contaminant, including smoke, vapor, soot, fumes, acids, alkalis, chemicals and waste. Waste includes materials to be recycled, reconditioned or reclaimed.

**16. "Products-completed operations hazard":**

- a. Includes all "bodily injury" and "property damage" occurring away from premises you own or rent and arising out of "your product" or "your work" except:

- (1) Products that are still in your physical possession; or
- (2) Work that has not yet been completed or abandoned. However, "your work" will be deemed completed at the earliest of the following times:
  - (a) When all of the work called for in your contract has been completed.
  - (b) When all of the work to be done at the job site has been completed if your contract calls for work at more than one job site.
  - (c) When that part of the work done at a job site has been put to its intended use by any person or organization other than another contractor or subcontractor working on the same project.

Work that may need service, maintenance, correction, repair or replacement, but which is otherwise complete, will be treated as completed.

- b. Does not include "bodily injury" or "property damage" arising out of:
  - (1) The transportation of property, unless the injury or damage arises out of a condition in or on a vehicle not owned or operated by you, and that condition was created by the "loading or unloading" of that vehicle by any insured;
  - (2) The existence of tools, uninstalled equipment or abandoned or unused materials; or
  - (3) Products or operations for which the classification, listed in the Declarations or in a policy schedule, states that products-completed operations are subject to the General Aggregate Limit.

**17. "Property damage" means:**

- a. Physical injury to tangible property, including all resulting loss of use of that property. All such loss of use shall be deemed to occur at the time of the physical injury that caused it; or

- b.** Loss of use of tangible property that is not physically injured. All such loss of use shall be deemed to occur at the time of the "occurrence" that caused it.

For the purposes of this insurance, electronic data is not tangible property.

As used in this definition, electronic data means information, facts or programs stored as or on, created or used on, or transmitted to or from computer software, including systems and applications software, hard or floppy disks, CD-ROMS, tapes, drives, cells, data processing devices or any other media which are used with electronically controlled equipment.

- 18.** "Suit" means a civil proceeding in which damages because of "bodily injury", "property damage" or "personal and advertising injury" to which this insurance applies are alleged. "Suit" includes:

- a.** An arbitration proceeding in which such damages are claimed and to which the insured must submit or does submit with our consent; or
  - b.** Any other alternative dispute resolution proceeding in which such damages are claimed and to which the insured submits with our consent.

- 19.** "Temporary worker" means a person who is furnished to you to substitute for a permanent "employee" on leave or to meet seasonal or short-term workload conditions.

- 20.** "Volunteer worker" means a person who is not your "employee", and who donates his or her work and acts at the direction of and within the scope of duties determined by you, and is not paid a fee, salary or other compensation by you or anyone else for their work performed for you.

**21.** "Your product":

**a.** Means:

- (1)** Any goods or products, other than real property, manufactured, sold, handled, distributed or disposed of by:
    - (a)** You;
    - (b)** Others trading under your name; or
    - (c)** A person or organization whose business or assets you have acquired; and
  - (2)** Containers (other than vehicles), materials, parts or equipment furnished in connection with such goods or products.

**b.** Includes

- (1)** Warranties or representations made at any time with respect to the fitness, quality, durability, performance or use of "your product"; and
  - (2)** The providing of or failure to provide warnings or instructions.

- c.** Does not include vending machines or other property rented to or located for the use of others but not sold.

**22.** "Your work":

**a.** Means:

- (1)** Work or operations performed by you or on your behalf; and
  - (2)** Materials, parts or equipment furnished in connection with such work or operations.

**b.** Includes

- (1)** Warranties or representations made at any time with respect to the fitness, quality, durability, performance or use of "your work", and
  - (2)** The providing of or failure to provide warnings or instructions.

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY  
CG 20 10 07 04

THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.

**ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – SCHEDULED PERSON OR  
ORGANIZATION**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

**SCHEDULE**

Name Of Additional Insured Person(s) Or Organization(s):	Location(s) Of Covered Operations
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

**A. Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury", "property damage" or "personal and advertising injury" caused, in whole or in part, by:

1. Your acts or omissions; or
2. The acts or omissions of those acting on your behalf;

in the performance of your ongoing operations for the additional insured(s) at the location(s) designated above.

**B.** With respect to the insurance afforded to these additional insureds, the following additional exclusions apply:

This insurance does not apply to "bodily injury" or "property damage" occurring after:

1. All work, including materials, parts or equipment furnished in connection with such work, on the project (other than service, maintenance or repairs) to be performed by or on behalf of the additional insured(s) at the location of the covered operations has been completed; or
2. That portion of "your work" out of which the injury or damage arises has been put to its intended use by any person or organization other than another contractor or subcontractor engaged in performing operations for a principal as a part of the same project.

END OF SECTION 00 62 16.12

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY  
CG 20 37 07 04**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.****ADDITIONAL INSURED – OWNERS, LESSEES OR  
CONTRACTORS – COMPLETED OPERATIONS**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

**SCHEDULE**

Name Of Additional Insured Person(s) Or Organization(s):	Location And Description Of Completed Operations
Information required to complete this Schedule, if not shown above, will be shown in the Declarations.	

**Section II – Who Is An Insured** is amended to include as an additional insured the person(s) or organization(s) shown in the Schedule, but only with respect to liability for "bodily injury" or "property damage" caused, in whole or in part, by "your work" at the location designated and described in the schedule of this endorsement performed for that additional insured and included in the "products-completed operations hazard".

END OF SECTION 00 62 16.13

POLICY NUMBER:

COMMERCIAL GENERAL LIABILITY  
CG 25 04 03 97**THIS ENDORSEMENT CHANGES THE POLICY. PLEASE READ IT CAREFULLY.****DESIGNATED LOCATION(S)  
GENERAL AGGREGATE LIMIT**

This endorsement modifies insurance provided under the following:

COMMERCIAL GENERAL LIABILITY COVERAGE PART

**SCHEDULE****Designated Location(s):**

(If no entry appears above, information required to complete this endorsement will be shown in the Declarations as applicable to this endorsement.)

- A.** For all sums which the insured becomes legally obligated to pay as damages caused by "occurrences" under **COVERAGE A (SECTION I)**, and for all medical expenses caused by accidents under **COVERAGE C (SECTION I)**, which can be attributed only to operations at a single designated "location" shown in the Schedule above:
1. A separate Designated Location General Aggregate Limit applies to each designated "location", and that limit is equal to the amount of the General Aggregate Limit shown in the Declarations.
  2. The Designated Location General Aggregate Limit is the most we will pay for the sum of all damages under **COVERAGE A**, except damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard", and for medical expenses under **COVERAGE C** regardless of the number of:
    - a. Insureds;
    - b. Claims made or "suits" brought; or
    - c. Persons or organizations making claims or bringing "suits".
  3. Any payments made under **COVERAGE A** for damages or under **COVERAGE C** for medical expenses shall reduce the Designated Location General Aggregate Limit for that designated "location". Such payments shall not reduce the General Aggregate Limit shown in the Declarations nor shall they reduce any other Designated Location General Aggregate Limit for any other designated "location" shown in the Schedule above.
  4. The limits shown in the Declarations for Each Occurrence, Fire Damage and Medical Expense continue to apply. However, instead of being subject to the General Aggregate Limit shown in the Declarations, such limits will be subject to the applicable Designated Location General Aggregate Limit.

**B.** For all sums which the insured becomes legally obligated to pay as damages caused by "occurrences" under **COVERAGE A (SECTION I)**, and for all medical expenses caused by accidents under **COVERAGE C (SECTION I)**, which cannot be attributed only to operations at a single designated "location" shown in the Schedule above:

1. Any payments made under **COVERAGE A** for damages or under **COVERAGE C** for medical expenses shall reduce the amount available under the General Aggregate Limit or the Products-Completed Operations Aggregate Limit, whichever is applicable; and
2. Such payments shall not reduce any Designated Location General Aggregate Limit.

**C.** When coverage for liability arising out of the "products-completed operations hazard" is provided, any payments for damages because of "bodily injury" or "property damage" included in the "products-completed operations hazard" will reduce the Products-Completed Operations Aggregate Limit, and not reduce the General Aggregate Limit nor the Designated Location General Aggregate Limit.

**D.** For the purposes of this endorsement, the **Definitions** Section is amended by the addition of the following definition:

"Location" means premises involving the same or connecting lots, or premises whose connection is interrupted only by a street, roadway, waterway or right-of-way of a railroad.

**E.** The provisions of Limits Of Insurance (**SECTION III**) not otherwise modified by this endorsement shall continue to apply as stipulated.

Sample

END OF SECTION 00 62 16.14



AIA Document G702®, Application and Certificate for Payment, or G732™, Application and Certificate for Payment, Construction Manager as Adviser Edition, containing Contractor's signed certification is attached.

Use Column I on Contracts where variable retainage for line items may apply.

001

**AIA**<sup>®</sup> Document G702<sup>®</sup> – 1992

Application and Certificate for Payment

TO OWNER: University of Maine System  
by and through  
University of Maine  
5765 Service Building  
Orono, ME 04469

PROJECT:

FROM CONTRACTOR:

VIA ARCHITECT:

APPLICATION NO:  
PERIOD TO:

CONTRACT FOR:  
CONTRACT DATE:  
PROJECT NOS: / /

Distribution to:  
OWNER: ☐  
ARCHITECT: ☐  
CONTRACTOR: ☐  
FIELD: ☐  
OTHER: ☐

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.  
AIA Document G703<sup>®</sup>, Continuation Sheet, is attached.

1. ORIGINAL CONTRACT SUM ..... 0.00

2. NET CHANGE BY CHANGE ORDERS ..... 0.00

3. CONTRACT SUM TO DATE (Line 1 ± 2) ..... 0.00

4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) ..... 0.00

5. RETAINAGE:

a. 0 % of Completed Work  
(Column D + E on G703) 0.00

b. 0 % of Stored Material  
(Column F on G703) 0.00

Total Retainage (Lines 5a + 5b or Total in Column I of G703) ..... 0.00

CONTRACTOR: By: Date:

County of: State of:

Subscribed and sworn to before  
me this day of

Notary Public: My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED ..... 0.00  
(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT: By: Date:

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

CHANGE ORDER SUMMARY		ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner		0.00	0.00
Total approved this Month		0.00	0.00
TOTALS		0.00	0.00
NET CHANGES by Change Order			0.00

SECTION 00 62 76.13  
SAMPLE

SALES TAX FORM

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

VENDOR: \_\_\_\_\_

Vendor Name

\_\_\_\_\_  
Vendor Address

\_\_\_\_\_  
Vendor City, State Zip

I hereby certify under penalties of perjury, that:

I am engaged in the performance of a construction contract on a project for the University of Maine System which is a Sales Tax exempt organization under the Maine Sales and Use Tax Law, Section 1760, subsection 2 and 16:

This project is titled: UMF Purington & Mallett Hall Restroom Renovations  
Project Title

The project is located at: UNIVERSITY OF MAINE FARMINGTON  
Campus Name or Town

This certificate is issued to cover purchases of materials that will be permanently incorporated into the real property belonging to the exempt organization or government agency indicated above.

Signed: \_\_\_\_\_  
Authorized Signature

Name & Title: \_\_\_\_\_

Firm Name: \_\_\_\_\_

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

Firm City, State Zip \_\_\_\_\_

END OF SECTION 00 62 76.13



# AIA<sup>®</sup> Document G707A<sup>™</sup> – 1994

## Consent of Surety to Reduction in or Partial Release of Retainage

**PROJECT:** *(Name and address)*  
Samples

**ARCHITECT'S PROJECT NUMBER:**

**OWNER:** ☐

**CONTRACT FOR:**

**ARCHITECT:** ☐

**TO OWNER:** *(Name and address)*  
University of Maine System  
by and through  
University of Maine  
5765 Service Building  
Orono, ME 04469

**CONTRACT DATED:**

**CONTRACTOR:** ☐

**SURETY:** ☐

**OTHER:** ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the  
*(Insert name and address of Surety)*

on bond of  
*(Insert name and address of Contractor)*

, SURETY,

hereby approves the reduction in or partial release of retainage to the Contractor as follows:

, CONTRACTOR,

The Surety agrees that such reduction in or partial release of retainage to the Contractor shall not relieve the Surety of any of its obligations to  
*(Insert name and address of Owner)*

as set forth in said Surety's bond.

, OWNER,

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:  
*(Insert in writing the month followed by the numeric date and year.)*

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

\_\_\_\_\_  
*(Signature of authorized representative)*

Attest:  
(Seal):

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

00 62 79  
SAMPLE  
STORED MATERIALS

University of Maine System  
by and through  
University of Maine  
5765 Service Building  
Orono ME 04469

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

Location: University of Maine

Contractor: \_\_\_\_\_

Materials and/or equipment (hereinafter "Materials") that have not yet been incorporated into the work may be delivered and suitably stored, at the site or some other location agreed upon by the Owner. The Materials listed below have been estimated at 100% of the cost and will be stored at \_\_\_\_\_. The Owner will reimburse the Contractor based upon the prices included on the Schedule of Values Form, 00 62 73(AIA G703), less the cost of installation. The Contractor must complete sufficient copies of this Stored Materials Form, 00 62 79, to accompany the Application for Payment. The Contractor shall secure the signature of its bonding company on all forms and shall also provide a Power of Attorney from the bonding company.

**SCHEDULE**

Qty	Material/Equipment	Item in AIA G703		Unit Wholesale Price	Extended Wholesale Price
		Item No	Unit Price		
Total					

Surety \_\_\_\_\_

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

**Power of Attorney Must be Attached**

Attorney-in-Fact

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

**BILL OF SALE**

The Contractor, \_\_\_\_\_, (will store/has stored) certain Materials (at the site of this project/at an approved warehouse/at bonded warehouse) and will be paid in accordance with the provisions of the General Conditions of the Contract for Construction. In consideration of the sum of \$\_\_\_\_\_ paid to the contractor by the Owner, and, in compliance with the provisions of the Contract, and, with the intention to be legally bound, the Contractor does hereby grant, bargain, sell and deliver unto the Owner, its successors and assigns, all and singular, the Materials described in the schedule above. The Contractor agrees that:

1. Contractor has good title to the Materials, free and clear of all liens and encumbrances, and title is granted to the Owner;
2. The Materials will be used only in the construction of the above referenced project, under the provisions of the Contract, and will not be diverted elsewhere without the prior written consent of the Owner;
3. The Materials have been delivered to and are at the places approved for storage, and they are clearly marked and identified as the property of the Owner and are stored in a safe and secure manner to protect from damage or loss;

4. The Contractor will pay all expenses in connection with the sale, delivery, storage, protection and insurance of Materials granted to the Owner.
5. The Contractor will remain responsible for the Materials, which will remain under its custody and control for all losses, and will fully indemnify the Owner for the cost of the Materials should the Materials be lost or damaged or stolen, regardless of exclusions in insurance policies required under this document. The contractor has insured the Materials against loss or damage by fire (with extended coverage), theft and burglary, with loss payable to the Owner;
6. The Contractor agrees that the quantities of Materials set forth in the Schedule of Values Form represents the maximum quantities for which it may be entitled to payment under the provisions of the contract;
7. The following information is included with this form:

- (1) An Application for Payment;
- (2) An invoice or copy of an invoice for Materials stored;
- (3) Evidence of payment, or when payment has not been made, a letter on the Contractor's letterhead authorizing payment to be made jointly to the Contractor and the Supplier;
- (4) Photographs showing the stored Materials and its location;
- (5) a fire and theft insurance policy rider for the stored Materials.
- (6) a warehouseman's receipt acknowledging that the Materials being stored at the warehouse are being held for the benefit of the Contractor or/or University.

Witness:

\_\_\_\_\_

By: \_\_\_\_\_ (SEAL)  
Principal/Contractor-Individual

Witness:

\_\_\_\_\_

\_\_\_\_\_  
Principal/Contractor-Individual

\_\_\_\_\_

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

\_\_\_\_\_

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

\_\_\_\_\_

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

Attest:

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

\_\_\_\_\_  
Principal/Contractor-Corporation

\_\_\_\_\_

Secretary

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

END OF SECTION 00 62 79



# AIA<sup>®</sup> Document G716<sup>™</sup> – 2004

## Request for Information (“RFI”)

TO:

FROM:

PROJECT:

Samples

ISSUE DATE:

RFI No.

PROJECT NUMBERS:

/

REQUESTED REPLY DATE:

COPIES TO:

**RFI DESCRIPTION:** *(Fully describe the question or type of information requested.)*

**REFERENCES/ATTACHMENTS:** *(List specific documents researched when seeking the information requested.)*

**SPECIFICATIONS:**

**DRAWINGS:**

**OTHER:**

**SENDER'S RECOMMENDATION:** *(If RFI concerns a site or construction condition, the sender may provide a recommended solution, including cost and/or schedule considerations.)*

**RECEIVER'S REPLY:** *(Provide answer to RFI, including cost and/or schedule considerations.)*

BY

DATE

COPIES TO

**Note:** This reply is not an authorization to proceed with work involving additional cost, time or both. If any reply requires a change to the Contract Documents, a Change Order, Construction Change Directive or a Minor Change in the work must be executed in accordance with the Contract Documents.



# AIA® Document G710™ – 2017

## Architect's Supplemental Instructions

---

**PROJECT:** *(name and address)*

Samples

**CONTRACT INFORMATION:**

Contract For:

Date:

**ASI INFORMATION:**

ASI Number:

Date:

**OWNER:** *(name and address)*

University of Maine System  
by and through  
University of Maine  
5765 Service Building  
Orono, ME 04469

**ARCHITECT:** *(name and address)***CONTRACTOR:** *(name and address)*

---

The Contractor shall carry out the Work in accordance with the following supplemental instructions without change in Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgment that there will be no change in the Contract Sum or Contract Time.

*(Insert a detailed description of the Architect's supplemental instructions and, if applicable, attach or reference specific exhibits.)*

---

**ISSUED BY THE ARCHITECT:**

\_\_\_\_\_  
**ARCHITECT** *(Firm name)*

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

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



# AIA<sup>®</sup> Document G714<sup>™</sup> – 2017

## Construction Change Directive

**PROJECT:** *(name and address)*  
Samples

**CONTRACT INFORMATION:**  
Contract For:  
Date:

**CCD INFORMATION:**  
Directive Number:  
Date:

**OWNER:** *(name and address)*  
University of Maine System  
by and through  
University of Maine  
5765 Service Building  
Orono, ME 04469

**ARCHITECT:** *(name and address)*

**CONTRACTOR:** *(name and address)*

The Contractor is hereby directed to make the following change(s) in this Contract:  
*(Insert a detailed description of the change and, if applicable, attach or reference specific exhibits.)*

### PROPOSED ADJUSTMENTS

- The proposed basis of adjustment to the Contract Sum or Guaranteed Maximum Price is:
  - ☐ Lump Sum decrease of \$0.00
  - ☐ Unit Price of \$          per
  - ☐ Cost, as defined below, plus the following fee:  
*(Insert a definition of, or method for determining, cost)*
  - ☐ As follows:

- The Contract Time is proposed to          . The proposed adjustment, if any, is          .

**NOTE:** *The Owner, Architect and Contractor should execute a Change Order to supersede this Construction Change Directive to the extent they agree upon adjustments to the Contract Sum, Contract Time, or Guaranteed Maximum price for the change(s) described herein.*

When signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change(s) described above.

Contractor signature indicates agreement with the proposed adjustments in Contract Sum and Contract Time set forth in this CCD.

\_\_\_\_\_  
**ARCHITECT** *(Firm name)*

\_\_\_\_\_  
**OWNER** *(Firm name)*

\_\_\_\_\_  
**CONTRACTOR** *(Firm name)*

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

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

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

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



# AIA<sup>®</sup> Document G709<sup>™</sup> – 2018

## Proposal Request

---

**PROJECT:** *(name and address)*

Samples

**CONTRACT INFORMATION:**

Contract For:

Date:

Architect's Project Number:

Proposal Request Number:

Proposal Request Date:

**OWNER:** *(name and address)*

University of Maine System

by and through

University of Maine

5765 Service Building

Orono, ME 04469

**ARCHITECT:** *(name and address)***CONTRACTOR:** *(name and address)*

---

The Owner requests an itemized proposal for changes to the Contract Sum and Contract Time for proposed modifications to the Contract Documents described herein. The Contractor shall submit this proposal within Zero (0) days or notify the Architect in writing of the anticipated date of submission.

*(Insert a detailed description of the proposed modifications to the Contract Documents and, if applicable, attach or reference specific exhibits.)*

**THIS IS NOT A CHANGE ORDER, A CONSTRUCTION CHANGE DIRECTIVE, OR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED IN THE PROPOSED MODIFICATIONS.**

---

**REQUESTED BY THE ARCHITECT:**

---

**PRINTED NAME AND TITLE**



# AIA<sup>®</sup> Document G701™ – 2017

## Change Order

**PROJECT:** *(Name and address)*  
Samples

**CONTRACT INFORMATION:**  
Contract For:  
Date:

**CHANGE ORDER INFORMATION:**  
Change Order Number:  
Date:

**OWNER:** *(Name and address)*  
University of Maine System  
by and through  
University of Maine  
5765 Service Building  
Orono, ME 04469

**ARCHITECT:** *(Name and address)*

**CONTRACTOR:** *(Name and address)*

### THE CONTRACT IS CHANGED AS FOLLOWS:

*(Insert a detailed description of the change and, if applicable, attach or reference specific exhibits. Also include agreed upon adjustments attributable to executed Construction Change Directives.)*

The original Contract Sum was	\$	0.00
The net change by previously authorized Change Orders	\$	0.00
The Contract Sum prior to this Change Order was	\$	0.00
The Contract Sum will be increased by this Change Order in the amount of	\$	0.00
The new Contract Sum including this Change Order will be	\$	0.00

The Contract Time will be increased by Zero (0) days.  
The new date of Substantial Completion will be

**NOTE:** This Change Order does not include adjustments to the Contract Sum or Guaranteed Maximum Price, or the Contract Time, that have been authorized by Construction Change Directive until the cost and time have been agreed upon by both the Owner and Contractor, in which case a Change Order is executed to supersede the Construction Change Directive.

**NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER.**

\_\_\_\_\_  
**ARCHITECT** *(Firm name)*

\_\_\_\_\_  
**CONTRACTOR** *(Firm name)*

\_\_\_\_\_  
**OWNER** *(Firm name)*

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

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

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

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



# AIA® Document G704™ – 2017

## Certificate of Substantial Completion

**PROJECT:** *(name and address)*

Samples

**CONTRACT INFORMATION:**

Contract For:

Date:

**CERTIFICATE INFORMATION:**

Certificate Number:

Date:

**OWNER:** *(name and address)*

University of Maine System

by and through

University of Maine

5765 Service Building

Orono, ME 04469

**ARCHITECT:** *(name and address)*
**CONTRACTOR:** *(name and address)*

The Work identified below has been reviewed and found, to the Architect's best knowledge, information, and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated below is the date established by this Certificate.

*(Identify the Work, or portion thereof, that is substantially complete.)*

**ARCHITECT** *(Firm Name)*
**SIGNATURE**
**PRINTED NAME AND TITLE**
**DATE OF SUBSTANTIAL COMPLETION**
**WARRANTIES**

The date of Substantial Completion of the Project or portion designated above is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

*(Identify warranties that do not commence on the date of Substantial Completion, if any, and indicate their date of commencement.)*

**WORK TO BE COMPLETED OR CORRECTED**

A list of items to be completed or corrected is attached hereto, or transmitted as agreed upon by the parties, and identified as follows:

*(Identify the list of Work to be completed or corrected.)*

The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first. The Contractor will complete or correct the Work on the list of items attached hereto within ( ) days from the above date of Substantial Completion.

Cost estimate of Work to be completed or corrected: \$

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and other items identified below shall be as follows:

*(Note: Owner's and Contractor's legal and insurance counsel should review insurance requirements and coverage.)*

The Owner and Contractor hereby accept the responsibilities assigned to them in this Certificate of Substantial Completion:

**CONTRACTOR** *(Firm Name)*

Name)

**SIGNATURE**
**PRINTED NAME AND TITLE**
**DATE**
**OWNER** *(Firm Name)*
**SIGNATURE**
**PRINTED NAME AND TITLE**
**DATE**

SECTION 00 65 19  
CERTIFICATE OF COMPLETION FORM  
(Final)

DATE:

PROJECT NAME: UMF Purington & Mallett Restroom Renovations

SUBSTANTIAL COMPLETION DATE:

FINAL COMPLETION is defined, in accordance with Article 9 of the A201 General Conditions of the Contract for Construction, as the date certified by the Architect when all the Work of the Project is fully complete, the Close-Out requirements of Paragraph 9.10 of the General Conditions have been completed, including the Close-Out Meeting and approval of Close-Out by the Architect, in accordance with Subparagraph 9.10.2, and the Contract fully performed in accordance with the Contract Documents, and the Contractor entitled to final payment.

The CONTRACTOR certifies that the Work is fully completed and was completed on or before \_\_\_\_\_, 20\_\_\_\_, and submits herewith:

Application for Final Payment (AIA G702)  
Affidavit of Payments (AIA G706)  
Consent of Surety (AIA G707)  
Releases of Liens (AIA G706A)  
Waiver of Lien

CONTRACTOR:

By: \_\_\_\_\_ Date: \_\_\_\_\_  
Name: \_\_\_\_\_

The ARCHITECT has inspected the Work and has determined that the Date of Final Completion was \_\_\_\_\_, 20\_\_\_\_.

ARCHITECT:

By: \_\_\_\_\_ Date: \_\_\_\_\_  
Name: \_\_\_\_\_

The OWNER hereby accepts the Work as fully complete and will make final payment.

OWNER:

By: \_\_\_\_\_ Date: \_\_\_\_\_  
Carolyn McDonough  
Director of Capital Planning & Project Management  
University of Maine System

END OF SECTION 00 65 19



# AIA<sup>®</sup> Document G706<sup>™</sup> – 1994

## Contractor's Affidavit of Payment of Debts and Claims

**PROJECT:** *(Name and address)*  
Samples

**ARCHITECT'S PROJECT NUMBER:**

OWNER: ☐

ARCHITECT: ☐

CONTRACTOR: ☐

SURETY: ☐

OTHER: ☐

**TO OWNER:** *(Name and address)*  
University of Maine System  
by and through  
University of Maine  
5765 Service Building  
Orono, ME 04469

**CONTRACT FOR:**  
**CONTRACT DATED:**

**STATE OF:**  
**COUNTY OF:**

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

### EXCEPTIONS:

#### SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☐ No

*The following supporting documents should be attached hereto if required by the Owner:*

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.
3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

**CONTRACTOR:** *(Name and address)*

BY:

*(Signature of authorized representative)*

*(Printed name and title)*

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:



# AIA<sup>®</sup> Document G706A<sup>™</sup> – 1994

## Contractor's Affidavit of Release of Liens

**PROJECT:** *(Name and address)*

Samples

**ARCHITECT'S PROJECT NUMBER:**

**OWNER:** ☐

**CONTRACT FOR:**

**ARCHITECT:** ☐

**CONTRACT DATED:**

**CONTRACTOR:** ☐

**TO OWNER:** *(Name and address)*

University of Maine System

by and through

University of Maine

5765 Service Building

Orono, ME 04469

**SURETY:** ☐

**OTHER:** ☐

**STATE OF:**

**COUNTY OF:**

The undersigned hereby certifies that to the best of the undersigned's knowledge, information and belief, except as listed below, the Releases or Waivers of Lien attached hereto include the Contractor, all Subcontractors, all suppliers of materials and equipment, and all performers of Work, labor or services who have or may have liens or encumbrances or the right to assert liens or encumbrances against any property of the Owner arising in any manner out of the performance of the Contract referenced above.

### EXCEPTIONS:

#### SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.

**CONTRACTOR:** *(Name and address)*

BY:

\_\_\_\_\_  
*(Signature of authorized representative)*

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

Subscribed and sworn to before me on this date:

Notary Public:

My Commission Expires:

SAMPLE

SECTION 00 65 19.17  
WAIVER OF LIEN

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

State of Maine

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

TO: University of Maine System  
by and through  
University of Maine  
5765 Service Building  
Orono, ME 04469

**SUBJECT:**

Project Name: UMF Purington & Mallett Restroom Renovations

Project Location: UNIVERSITY OF MAINE FARMINGTON

Upon receipt of the sum of \_\_\_\_\_ (being the balance due us under the existing contract or subcontract agreement for work on the Subject Project) the undersigned agrees that it will waive and release the University of Maine System from any and all lien or claim or right to lien on the Subject Project under the Statutes of the state of Maine relating to liens for labor, materials and/or subcontracts furnished for the Subject Project on premises belonging to the University of Maine System.

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

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

Firm Name: \_\_\_\_\_

**NOTARY**

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

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

END OF SECTION 00 65 19.17

SUBCONTRACTOR/SUPPLIER CONDITIONAL  
RELEASE AND WAIVER OF LIEN

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

State of Maine  
County of Penobscot

**SUBJECT:**

Project Name: UMF Purington & Mallett Restroom Renovations

Project Location: \_\_\_\_\_

\_\_\_\_\_ (hereinafter called the Subcontractor) in consideration of the sum of \$ \_\_\_\_\_ to be paid to Subcontractor by \_\_\_\_\_ upon receipt of said payment does hereby release and forever discharge \_\_\_\_\_ and the **University of Maine System** from any and all workman's, materialman's, mechanic's, building or other liens, claims, causes of action, liabilities and other obligations with respect to the value of any and all work, services and materials furnished, performed, or supplied by the subcontractor to or in connection with the construction project known as the Insert Project Name Here located in Insert Location Here (hereinafter called the "Premises") through the date of \_\_\_\_\_. Subcontractor shall take all reasonable action to discharge any lien currently filed or pending against \_\_\_\_\_ and the **University of Maine System**, including without limitation the recording of instruments discharging said lien with the appropriate Registry of Deeds.

Subcontractor acknowledges that its receipt of said payment will constitute full and final payment for all work performed by Subcontractor through the date set forth above except for retainage if applicable, in the amount of (\$) \_\_\_\_\_.

Subcontractor further covenants and represents that all of the subcontract suppliers, mechanics, materialmen, and laborers listed below engaged by Subcontractor have been paid in full (less proper retainage if any) or shall be immediately paid in full from the proceeds of this current payment for all work done and or materials furnished to the Premises through the date set forth in the first paragraph above. The Subcontractor hereby agrees to indemnify, defend, and hold \_\_\_\_\_ and The **University of Maine System** harmless from any and all claims, including but not limited to attorney fees, claims for payment, and liens of any kind or nature filed or made by any person or entity based upon work done or materials furnished in connection with the Premises by the Subcontractor or any sub-subcontractor, suppliers, mechanics, materialmen, and laborers employed by Subcontractor through the date set forth in the first paragraph above. Subcontractor shall request any sub-subcontractor, suppliers, mechanics, materialmen, and laborers employed by Subcontractor through the date set forth in the first paragraph above to, and shall itself, take all reasonable action to discharge any lien in connection with payments owed by Subcontractor currently filed or pending against \_\_\_\_\_ and the **University of Maine System**, including without limitation the recording of instruments discharging said lien with the appropriate Registry of Deeds.

Major sub-subcontractors and suppliers whose contract or purchase order meets or exceeds \$5,000 working for said Subcontractor for the period stated above:

SECTION 00 65 19.18

The undersigned represents that he is authorized by all corporate or other action necessary to execute and deliver this release.

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

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

Firm Name: \_\_\_\_\_

**NOTARY**

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

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

END OF SECTION 00 65 19.18



# AIA<sup>®</sup> Document G707<sup>™</sup> – 1994

## Consent Of Surety to Final Payment

**PROJECT:** *(Name and address)*  
Samples

**ARCHITECT'S PROJECT NUMBER:**

**OWNER:** ☐

**CONTRACT FOR:**

**ARCHITECT:** ☐

**CONTRACT DATED:**

**CONTRACTOR:** ☐

**TO OWNER:** *(Name and address)*  
University of Maine System  
by and through  
University of Maine  
5765 Service Building  
Orono, ME 04469

**SURETY:** ☐

**OTHER:** ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the  
*(Insert name and address of Surety)*

on bond of  
*(Insert name and address of Contractor)*

, SURETY,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall  
not relieve the Surety of any of its obligations to  
*(Insert name and address of Owner)*

, CONTRACTOR,

as set forth in said Surety's bond.

, OWNER,

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:  
*(Insert in writing the month followed by the numeric date and year.)*

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

\_\_\_\_\_  
*(Signature of authorized representative)*

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

Attest:  
(Seal):



# AIA® Document A201® – 2017

## General Conditions of the Contract for Construction

for the following PROJECT:  
(Name and location or address)

THE OWNER:  
(Name, legal status and address)

University of Maine System  
by and through

THE ARCHITECT:  
(Name, legal status and address)

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

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

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## ARTICLE 1 GENERAL PROVISIONS

### § 1.1 Basic Definitions

#### § 1.1.1 The Contract Documents

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

#### § 1.1.2 The Contract

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

#### § 1.1.3 The Work

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

#### § 1.1.4 The Project

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

#### § 1.1.5 The Drawings

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

#### § 1.1.6 The Specifications

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

#### § 1.1.7 Instruments of Service

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

#### § 1.1.8 Initial Decision Maker

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

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

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

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

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. Where the Procurement Requirements include provisions that portions of the Work be File Bid in accordance with the requirements of the Maine Bid Depository System, the subcontracts for these portions of the work will cover the same scope of work as defined by the Procurement Requirements and the File Bid and shall have the same contract amount as listed in the successful bid.

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

### § 1.3 Capitalization

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

### § 1.4 Interpretation

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

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

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights. The provisions of this section shall not be deemed to modify the contract between the University of Maine System (the Owner) and the Architect under B102-2017 and B201-2017.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants. The provisions of this section shall not be deemed to modify the contract between the University of Maine System (the Owner) and the Architect under B102-2017 and B201-2017.

### § 1.6 Notice

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

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

### § 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties ~~will use AIA Document~~ may use AIA Document G201-2013 Project Digital Data Protocol Form and E203™-2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

### § 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™-2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™-2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

## ARTICLE 2 OWNER

### § 2.1 General

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

.1 For the purpose of this Contract, the Owner is defined as: University of Maine System, acting through its duly authorized agent.

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

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

§ 2.2.1 ~~Prior to~~ Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. ~~The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.~~

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

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

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor. Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

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

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

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

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. Architect is a person or entity lawfully licensed to practice in the State of Maine. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number. Whenever the prime professional designer for the Work is an Engineer, the term Architect, wherever used in these documents shall have the term Engineer substituted for the term Architect. The Engineer shall be lawfully licensed to practice engineering in the State of Maine or an entity lawfully practicing engineering identified as such in the Agreement.

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

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work at all times conduct safe performance of the Work, including but not limited to appropriate precautions.

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

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

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

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

to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

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

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

### ARTICLE 3 CONTRACTOR

#### § 3.1 General

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

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

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

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

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

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

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

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors,

inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 Supervision and Construction Procedures

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

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

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

§ 3.4 Labor and Materials

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

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

§ 3.4.2.1 After the Contract has been executed, the Owner and Architect may consider a formal request for substitution of products in place of those specified. The Owner shall deduct from the next payment made from the Contract Sum amounts paid to the Architect to evaluate the Contractor's proposed substitutions and to make agreed-upon changes in the Drawings and Specifications made necessary by the Owner's acceptance of the substitutions.

By making requests for substitutions, the Contractor

- .1 Represents that the Contractor has personally investigated the proposed substitute product and determined it is equal or superior in all respects to that specified;
- .2 Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
- .3 Certifies that the cost data presented is complete and includes all related costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and,
- .4 Will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be completed in all respects.

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

§ 3.4.4 If a wage scale prepared by the State of Maine Department of Labor, Bureau of Labor Standards, is included in the Contract Documents, such wage scale represents the minimum wages that must be paid in each category of labor employed on the project.

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The provisions of Title 26 MRSA Chapter 15 Preference to Maine Workers and Contractors, apply to this project, including but not limited to:

**§ 1310. Wage and benefits rates to be kept posted**

A clearly legible statement of all fair minimum wage and benefits rates to be paid the several classes of laborers, workers and mechanics employed on the construction on the public work must be kept posted in a prominent and easily accessible place at the site by each contractor and subcontractor subject to sections 1304 to 1313.

**§ 1311. Wage and benefit record of contractor**

The contractor and each subcontractor in charge of the construction of a public work shall keep an accurate record showing the names and occupation of all laborers, workers and mechanics employed by them and all independent contractors working under contract with them in connection with the construction on the public works. The record must also show for all laborers, workers, mechanics and independent contractors the hours worked, the title of the job, the hourly rate or other method of remuneration and the actual wages or other compensation paid to each of the laborers, workers, mechanics and independent contractors. A copy of each record must be kept at the job site and must be open at all reasonable hours to the inspection of the Bureau of Labor Standards and the public authority that let the contract and its officers and agents. It is not necessary to preserve those records for a period longer than 3 years after the termination of the contract. A copy of each such record must also be filed monthly with the public authority that let the contract. The filed record is a public record pursuant to Title 1, chapter 13, except that the public authority letting a contract shall adopt rules to protect the privacy of personal information contained in the records filed with the public authority under this section, such as Social Security numbers and taxpayer identification numbers. The rules may not prevent the disclosure of information regarding the classification of workers or independent contractors and the remuneration they receive. Such rules are routine technical rules as defined by Title 5, chapter 375, subchapter 2-A.

**§ 3.4.5** If a wage scale prepared by the U.S. Department of Labor pursuant to the provision of the Davis-Bacon Act is included in the Contract Documents, such wage scale represents the minimum wages that must be paid in each category of labor on the project. The requirements and responsibilities within the Davis-Bacon Act apply to this project if a Davis-Bacon wage scale is included.

**§ 3.4.6 EQUAL EMPLOYMENT OPPORTUNITY**

During the performance of this contract, the contractor agrees as follows:

- .1 The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, sexual orientation, including transgender status, gender, gender identity or gender expression, ethnicity, national origin or citizenship status, familial status, ancestry, age, disability physical or mental, genetic information, veteran or military status status. Such action shall include, but not be limited to, the following: employment, upgrading, demotions, transfers, recruitment or recruitment advertising; layoffs or terminations; rates of pay or other forms of compensation; and selection for training, including apprenticeship.
- .2 The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, sexual orientation, including transgender status, gender, gender identity or gender expression, ethnicity, national origin or citizenship status, familial status, ancestry, age, disability physical or mental, genetic information, veteran or military status.
- .3 The contractor will send to each labor union or representative of the workers with which there is a collective or bargaining agreement in place, or other contract or understanding, whereby labor is being furnished for the performances of his contract, a notice, as set forth by the Maine Human Rights Commission, found on their website ([https://www1.maine.gov/mhrc/guidance/mhra\\_guarantees.htm](https://www1.maine.gov/mhrc/guidance/mhra_guarantees.htm)), to be provided by the contracting department or agency, advising the said labor union or workers' representative of the contractor's commitment under the provisions of the contract, and shall post copies of the notice in conspicuous places available to employees and to applicants for employment.
- .4 The contractor will cause the foregoing provisions to be inserted in all contracts for any work covered by this agreement so that such provisions will be binding upon each subcontractor.

.5 Contractors and subcontractors with contracts in excess of \$50,000 will also pursue in good faith affirmative action programs.

§ 3.5 Warranty

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

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

§ 3.6 Taxes

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

§ 3.6.1 The University of Maine System is exempt from payment of taxes under the Maine Sales and Use Tax Law Title 36 Section 1760 for taxes on materials that are permanently incorporated into the real property belonging to the University of Maine System. The University of Maine System is also exempt from the payment of Federal Excise Taxes on articles not for resale and from the Federal Transportation Tax on all shipments; exemption certificates for these taxes will be furnished when required. All quotations shall be less these taxes. The contractor shall pay all other taxes that have been or are legally enacted.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

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

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

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

§ 3.7.4 Concealed or Unknown Conditions

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

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately

suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

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

§ 3.8.2 Unless otherwise provided in the Contract Documents,

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

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

§ 3.9 Superintendent

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

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

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

§ 3.10 Contractor's Construction and Submittal Schedules

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

- .1 The Contractor shall provide an updated Construction Schedule with each Application for Payment reflecting actual construction progress and activities.

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

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

§ 3.11 Documents and Samples at the Site

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

§ 3.12 Shop Drawings, Product Data and Samples

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

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

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

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

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

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

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

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

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

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

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

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

**§ 3.12.11 The Architect's review of the Contractor's submittals will be limited to examination of an initial submission and two (2) resubmittals. The Architect's review of additional submittals will be made only with the consent of the Owner after notification by the Architect. The Owner shall deduct from the next payment made from the Contract Sum amounts paid to the Architect for evaluation of such additional submittals.**

### § 3.13 Use of Site

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

### § 3.14 Cutting and Patching

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

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

### § 3.15 Cleaning Up

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

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

**§ 3.15.3 Waste Management.** The University is committed to a resource management strategy which reduces to a minimum the production of waste material while reusing, recycling or composting as much as possible of the remaining materials. Contractor will submit a construction waste management plan for the project that identifies opportunities to reduce, reuse, or recycle waste from renovations or new construction.

**§ 3.16 Access to Work**

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

**§ 3.17 Royalties, Patents and Copyrights**

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

**§ 3.18 Indemnification**

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

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

**ARTICLE 4 ARCHITECT**

**§ 4.1 General**

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

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

**§ 4.2 Administration of the Contract**

**§ 4.2.1** The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the final payment is due, and from time to time during the period for correction of Work described in § 12.2, and until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

**§ 4.2.2** The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, endeavor to guard the Owner against defects and deficiencies in the Work, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the

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construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

- .1 The Contractor shall reimburse the Owner for compensation paid to the Architect for additional site visits made necessary by the fault, neglect as determined solely by the Owner, or request of the Contractor. The reimbursement shall be deducted from the next payment made from the Contract Sum following the Owner's payment to the Architect.

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

#### § 4.2.4 Communications

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

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

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

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

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

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

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

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

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

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

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

## ARTICLE 5 SUBCONTRACTORS

### § 5.1 Definitions

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

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

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

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

- 1 The Contractor shall provide Owner a list of all subcontractors and independent contractors on the job site and a record of the entity to whom that subcontractor or independent contractor is directly contracted and by whom that subcontractor or independent contractor is insured for workers' compensation purposes. The list shall be presented at the preconstruction meeting and, when changes occur, at each requisition meeting as necessary.
- 2 Where the use of the Maine Bid Depository is required by the Procurement Requirements, Subcontractors included in the Contractor's Proposal shall be the Subcontractors for the defined Work unless a change has been approved by the Owner.

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

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

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Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

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

#### § 5.3 Subcontractual Relations

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

#### § 5.4 Contingent Assignment of Subcontracts

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

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

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

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

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

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

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

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

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

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

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schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

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

#### § 6.2 Mutual Responsibility

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

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

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

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

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

#### § 6.3 Owner's Right to Clean Up

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

### ARTICLE 7 CHANGES IN THE WORK

#### § 7.1 General

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

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

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

**§ 7.1.4 The combined overhead and profit included in the total cost to the Owner of a Change in the Work shall be based on a previously agreed upon unit pricing or on the following schedule allowing for appropriate allowances for contract duration:**

**.1 For the Contractor, for Work performed by the Contractor's own forces, 20% of the cost.**

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- .2 For the Contractor, for Work performed by the Contractor's Subcontractors, 10% of the amount due the Subcontractors.
- .3 For each Subcontractor involved, for Work performed by the Subcontractor's own forces, 20% of the cost.
- .4 For each Subcontractor involved, for Work performed by the Subcontractor's Sub-subcontractors, 10% of the amount due the Sub-subcontractor.
- .5 Costs to which overhead and profit is to be applied shall be limited to the following:
  - .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
  - .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
  - .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others; and,
  - .4 Costs of premiums for all bonds, insurance, permit fees, and sales, use or similar taxes related to the Work.

§ 7.1.5 When there is only an extension of Contract Time, any Claim for delay made pursuant to Article 15 is limited to additional costs related to supervision and field office personnel, which may be included in the overhead and profit calculation.

§ 7.1.6 In order to facilitate checking of quotations, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by complete itemization of costs including labor, materials and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are Subcontracts, they are to be itemized also. In no case will a change be approved without such itemization.

## § 7.2 Change Orders

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

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

## § 7.3 Construction Change Directives

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

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

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

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

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may

prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

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

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

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

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

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

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

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

#### § 7.4 Minor Changes in the Work

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

### ARTICLE 8 TIME

#### § 8.1 Definitions

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

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

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

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

## § 8.2 Progress and Completion

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

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

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

## § 8.3 Delays and Extensions of Time

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

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

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

## ARTICLE 9 PAYMENTS AND COMPLETION

### § 9.1 Contract Sum

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

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

### § 9.2 Schedule of Values

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

### § 9.3 Applications for Payment

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

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

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

**§ 9.3.1.3** The provisions of Title 5 M.R.S.A § 1746, as amended, pertain to this project. The Owner shall retain five percent (5%) of each payment due the Contractor as part of the security for the fulfillment of the Contract Agreement by the Contractor; the Contractor shall not withhold a greater percentage from subcontractors. The Owner may, if deemed expedient by the Owner, cause the Contractor to be paid temporarily or permanently from time to time during the progress of the work, such portion of the amount retained as the Owner deems prudent or desirable.

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

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

#### § 9.4 Certificates for Payment

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

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

#### § 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect ~~may~~ shall withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to

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make such representations to the Owner. The Architect ~~may~~ shall also withhold a Certificate for Payment or, because of subsequently discovered evidence, ~~may~~ shall nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work, i.e. Work that does not conform to the requirements of the Contract, shall include, but not be limited to, non-conforming Work, disputed Work, incomplete Work, and unacceptable Work, which is not remedied;  
.1 The Architect shall deduct and withhold from any certification for payment an amount equal to one hundred and fifty percent (150%) the value of any defective Work.
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

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

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

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

#### § 9.6 Progress Payments

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

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

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

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

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

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

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

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

§ 9.6.9 All Progress Payments and Final Payment are subject to the requirements of the "Maine Prompt Pay Act" Title 10 M.R.S.A. ch. 201-A, as amended. Payments shall be made on a timely basis in accord with the requirements of this Statute; however, the Contractor waives interest on any late payment.

#### § 9.7 Failure of Payment

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

#### § 9.8 Substantial Completion

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

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

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

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

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

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§ 9.9 Partial Occupancy or Use

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

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

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

§ 9.10 Final Completion and Final Payment

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

1. Except with the consent of the Owner, the Architect will perform no more than three (23) site reviews to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for any additional site reviews.

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

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

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certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

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

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

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

§ 9.11 The Contractor and the Contractor's Surety, if any, shall be liable for and shall pay the Owner the sums stipulated as liquidated damages in the Contract Documents for each calendar day of delay after the date established for Substantial Completion in the Contract Documents until the Work is substantially complete.

## ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

### § 10.1 Safety Precautions and Programs

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

### § 10.2 Safety of Persons and Property

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

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.
- .4 If this Contract involves renovation, repair, or preparation of surfaces for painting in pre-1978 apartments, houses, or spaces used by child care facilities, Contractor shall use certified workers who follow the lead-safe work practices as required by the US Environmental Protection Agency's Renovation, Repair and Remodeling rule described in 40 CFR § 745.85. Notification of the tenants or users under this rule will be the responsibility of the Owner.

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

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

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

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

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the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

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

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

§ 10.2.8 Injury or Damage to Person or Property

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

§ 10.3 Hazardous Materials and Substances

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

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. ~~Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection.~~ When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. ~~By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.~~

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, ~~including but not limited to exclusive of attorneys' fees~~, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity. This indemnification obligation shall not apply to any claim for which Owner would not be liable under the Maine Tort Claims Act (14 M.R.S.A. '8101, et seq.) if such claim were made directly against Owner and Owner shall continue to enjoy all rights, claims, immunities and defenses available to it under law.

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

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the

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Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

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

#### § 10.4 Emergencies

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

### ARTICLE 11 INSURANCE AND BONDS

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

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

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

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

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

#### § 11.2 Owner's Insurance

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

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

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

### § 11.3 Waivers of Subrogation

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

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

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

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards ~~however caused~~caused, with the exception of intentional acts or grossly negligent consultants, contractors or sub-contractors.

### §11.5 Adjustment and Settlement of Insured Loss

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

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have ~~14~~30 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising

out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

## ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

### § 12.1 Uncovering of Work

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

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

### § 12.2 Correction of Work

#### § 12.2.1 Before Substantial Completion

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

#### § 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

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

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

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

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

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

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§ 12.3 Acceptance of Nonconforming Work

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

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

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

§ 13.2 Successors and Assigns

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

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

§ 13.3 Rights and Remedies

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

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

§ 13.4 Tests and Inspections

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

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

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

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

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

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

~~§ 13.5 Interest~~

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

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

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

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

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

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

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

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

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

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

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

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

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

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

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

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

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

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

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

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

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

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the ~~Agreement~~Agreement; but not including overhead and profit on Work not executed.

### ARTICLE 15 CLAIMS AND DISPUTES

#### § 15.1 Claims

##### § 15.1.1 Definition

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

##### § 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law,

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but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

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

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

§ 15.1.4 Continuing Contract Performance

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

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

§ 15.1.5 Claims for Additional Cost

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

§ 15.1.6 Claims for Additional Time

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

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

§ 15.1.7 Waiver of Claims for Consequential Damages

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

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

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

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision

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shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

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

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

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

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

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

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

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

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

### § 15.3 Mediation

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

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of

60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

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

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

#### § 15.4 Arbitration

§ 15.4.1 ~~If the~~ The parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim this Agreement, any claim, dispute or other matter in question arising out of or related to this Agreement subject to, but not resolved by, mediation shall be subject to ~~arbitration which, arbitration, which~~ unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association conducted in the place where the Project is located, unless another place is mutually agreed upon, and in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. ~~The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon, this Agreement, except that the parties shall select only one Arbitrator, and there shall be no discovery. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, this Agreement, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded, defended.~~

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

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

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

#### § 15.4.4 Consolidation or Joinder

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

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

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

SECTION 00 73 00.11  
SAMPLE

SCHEDULE OF LIQUIDATED DAMAGES

Liquidated damages (a fixed amount set forth in the Contract) agreed to by the Owner and the Contractor are intended to compensate the Owner for unexcused delay in the performance of the Contract. The parties agree that the purpose of the liquidated damages schedule below is to establish, in advance, a reasonable estimate of the damages that would be incurred by the Owner if there is an unexcused delay, or a breach of Contract, which causes the work to be extended beyond the contractual substantial completion date. This agreement of liquidated damages by the parties is made to establish the reasonableness of them to the actual damages an Owner may have incurred due to unexcused delays by the Contractor, even though the actual damages may be an uncertain amount and unprovable.

The specific per diem rates of Liquidated Damages are (\_\_\_/[enter amt if can reasonably determine-provide method of determination; otherwise] set forth below). By executing the Contract, the Contractor acknowledges that such an amount is not a penalty and that the daily amount set forth in the Contract is a reasonable per diem forecast of damages incurred by the Owner due to the Contractor's failure to complete the Work within the Contract Time.

Original Contract Amount		Per Diem Amount of Liquidated Damages
From More Than	To and Including	
0	\$100,000	\$500
\$100,000	\$300,000	\$675
\$300,000	\$500,000	\$750
\$500,000	\$1,000,000	\$825
\$1,000,000	\$2,000,000	\$1,000
\$2,000,000	\$4,000,000	\$1,250
\$4,000,000	and more	\$1,500

END OF SECTION 00 73 00.11



# AIA® Document A101® – 2017 Exhibit A

## Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the N/A day of \_\_\_\_\_ in the year Sample  
(In words, indicate day, month and year.)

for the following **PROJECT**:  
(Name and location or address)

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

University of Maine System  
by and through  
University of Maine  
5765 Service Building  
Orono, ME 04469

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

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

This document is intended to be used in conjunction with AIA Document A201®–2017, General Conditions of the Contract for Construction. Article 11 of A201®–2017 contains additional insurance provisions.

### TABLE OF ARTICLES

- A.1 GENERAL**
- A.2 OWNER'S INSURANCE**
- A.3 CONTRACTOR'S INSURANCE AND BONDS**
- A.4 SPECIAL TERMS AND CONDITIONS**

#### ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

#### ARTICLE A.2 OWNER'S INSURANCE

##### § A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor's request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

## § A.2.2 Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual general liability insurance.

## § A.2.3 Required Property Insurance

§ A.2.3.1 Unless this obligation is placed on the Contractor pursuant to Section A.3.3.2.1, the Owner shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Owner's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until Substantial Completion and thereafter as provided in Section A.2.3.1.3, unless otherwise provided in the Contract Documents or otherwise agreed in writing by the parties to this Agreement. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

§ A.2.3.1.1 **Causes of Loss.** The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:

*(Indicate below the cause of loss and any applicable sub-limit.)*

§ A.2.3.1 For this project, Property Insurance coverage, up to the total amount of the Project, will be provided by the University by either adding the Project to the University's existing master property insurance or purchasing a stand-alone builder's risk policy. Coverage shall be included for the Contractor and all Subcontractors, as their interests may appear, while involved in the Project and until the work is completed or the contractor is otherwise advised in writing. This insurance is limited to the "all risk" type coverage provided under the University's master property insurance for direct physical loss or damage to the building or building materials related to the project, subject to standard policy limitations and exclusions. The contractor is responsible for a \$10,000 per claim deductible. Any other insurance desired by the Contractor beyond that covered by the University's insurance, or to cover the \$10,000 deductible, is the responsibility of the Contractor. This contract stands as verification of the University's property insurance coverage on the project and no further verification will be provided.

### Causes of Loss

### Sub-Limit

§ A.2.3.1.2 **Specific Required Coverages.** The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:

*(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)*

### Coverage

### Sub-Limit

§ A.2.3.1.3 Unless the parties agree otherwise, upon Substantial Completion, the Owner shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

§ A.2.3.1.4 **Deductibles and Self-Insured Retentions.** If the insurance required by this Section A.2.3 is subject to deductibles or self-insured retentions, the Owner shall be responsible for all loss not covered because of such deductibles or retentions.

§ A.2.3.2 **Occupancy or Use Prior to Substantial Completion.** The Owner's occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of

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coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

#### **§ A.2.3.3 Insurance for Existing Structures**

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Owner shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, "all risks" property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Owner shall be responsible for all co-insurance penalties.

#### **§ A.2.4 Optional Extended Property Insurance.**

The Owner shall purchase and maintain the insurance selected and described below.

*(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)*

- ☐ **§ A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance**, to reimburse the Owner for loss of use of the Owner's property, or the inability to conduct normal operations due to a covered cause of loss.
- ☐ **§ A.2.4.2 Ordinance or Law Insurance**, for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.
- ☐ **§ A.2.4.3 Expediting Cost Insurance**, for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.
- ☐ **§ A.2.4.4 Extra Expense Insurance**, to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.
- ☐ **§ A.2.4.5 Civil Authority Insurance**, for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.
- ☐ **§ A.2.4.6 Ingress/Egress Insurance**, for loss due to the necessary interruption of the insured's business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.
- ☐ **§ A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects,

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engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

#### § A.2.5 Other Optional Insurance.

The Owner shall purchase and maintain the insurance selected below.

*(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)*

☐ **§ A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information. *(Indicate applicable limits of coverage or other conditions in the fill point below.)*

☐ **§ A.2.5.2 Other Insurance**  
*(List below any other insurance coverage to be provided by the Owner and any applicable limits.)*

Coverage

Limits

### ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS

#### § A.3.1 General

**§ A.3.1.1 Certificates of Insurance.** The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies.

**§ A.3.1.1.1** Certificates of Insurance filed with the University of Maine System shall indicate the Certificate Holder as:

University of Maine System  
Office of Risk Management  
Robinson Hall  
46 University Drive  
Augusta, ME 04330

**§ A.3.1.2 Deductibles and Self-Insured Retentions.** The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

**§ A.3.1.3 Additional Insured Obligations.** To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04. All required insurance shall be provided by companies that have a current A.M. Best insurance rating of A- or better and that are licensed or approved to do business in the State of Maine.

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### § A.3.2 Contractor's Required Insurance Coverage

§ A.3.2.1 The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

*(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)*

### § A.3.2.2 Commercial General Liability

§ A.3.2.2.1 Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than two million dollars (\$ 2,000,000) each occurrence, two million dollars (\$ 2,000,000) general aggregate, and two million dollars (\$ 2,000,000) aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

§ A.3.2.2.2 The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- .1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
- .2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- .4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- .9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the Work involves such hazards.
- .11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than one million dollars (\$ 1,000,000) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

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**§ A.3.2.5 Workers' Compensation at statutory limits.**

**§ A.3.2.6** Employers' Liability with policy limits not less than five hundred thousand dollars (\$ 500,000.) each accident, five hundred thousand dollars (\$ 500,000.) each employee, and five hundred thousand dollars (\$ 500,000.) policy limit.

**§ A.3.2.7** Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and ~~docks~~ docks. Policy limits for such coverage shall not be less than five hundred thousand dollars (\$500,000) each accident, five hundred thousand dollars (\$500,000) each employee, and five hundred thousand dollars (\$500,000) policy limit. Contractor is required to provide proof of such coverage, if applicable to the Work, by submitting a copy of the endorsement or by submitting the USLH form WC 00 01 06 A (current edition).

**§ A.3.2.8** If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than one million dollars (\$ 1,000,000.) per claim and one million dollars (\$ 1,000,000.) in the aggregate.

**§ A.3.2.9** If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than one million dollars (\$ 1,000,000.) per claim and two million dollars (\$ 2,000,000.) in the aggregate.

**§ A.3.2.10** Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than one million dollars (\$ 1,000,000.) per claim and two million dollars (\$ 2,000,000.) in the aggregate.

**§ A.3.2.11** Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than two million dollars (\$ 2,000,000.) per claim and two million dollars (\$ 2,000,000.) in the aggregate.

**§ A.3.2.12** Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than one million dollars (\$ 1,000,000.) per claim and one million dollars (\$ 1,000,000.) in the aggregate. Authorization from Administration of the University of Maine System must be obtained thirty (30) days prior to the utilization of the equipment.

**§ A.3.3 Contractor's Other Insurance Coverage**

**§ A.3.3.1** Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

*(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)*

N/A

**§ A.3.3.2** The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

*(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)*

[ ] **§ A.3.3.2.1** Property insurance of the same type and scope satisfying the requirements identified in Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such ~~insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3-insurance.~~ The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any

deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below:

*(Where the Contractor's obligation to provide property insurance differs from the Owner's obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)*

- [ ] **§ A.3.3.2.2 Railroad Protective Liability Insurance**, with policy limits of not less than (\$ ) per claim and (\$ ) in the aggregate, for Work within fifty (50) feet of railroad property.
- [ ] **§ A.3.3.2.3 Asbestos Abatement Liability Insurance**, with policy limits of not less than one million dollars (\$ 1,000,000) per claim and two million dollars (\$ 2,000,000) in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.
- [ ] **§ A.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site on an "all-risks" completed value form.**
- [ ] **§ A.3.3.2.5 Property insurance on an "all-risks" completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.**
- [ ] **§ A.3.3.2.6 Other Insurance**  
*(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)*

Coverage	Limits

#### § A.3.4 Performance Bond and Payment Bond

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows: and the Contractor shall furnish a Performance Bond and a Payment Bond covering the faithful performance of the Contract and payment of obligations arising thereof. Bonds may be obtained through the Contractor's usual source and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal to 100% of the Contract Sum. Should the Contract Sum change during the contract and warranty periods, the amount of the Bonds will be changed to reflect the Contract Sum.

- .1 The Contractor shall deliver the required bonds to the Owner at the same time as the signed Contract Agreement is delivered to the Owner. Prior to the commencement of the Work, the Contractor shall submit satisfactory evidence that such bonds will be furnished.

*(Specify type and penal sum of bonds.)*

- .2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

Type	Penal Sum (\$0.00)
------	--------------------

Payment Bond

Performance Bond

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.**3**

The Contract Bonds shall continue in effect for one year after final acceptance of each contract to protect the Owner's interest in connection with the one year guarantee of workmanship and materials

Init.

and to assure settlement of claims, for the payment of all bills for labor, materials, and equipment by the Contractor.

ARTICLE A.4 SPECIAL TERMS AND CONDITIONS

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

N/A



State of Maine  
Department of Labor  
Bureau of Labor Standards  
Augusta, Maine 04333-0045  
Telephone (207) 623-7906

Wage Determination - In accordance with 26 MRS §1301 et. seq., this is a determination by the Bureau of Labor Standards, of the fair minimum wage rate to be paid to laborers and workers employed on the below titled project.

2023 Fair Minimum Wage Rates  
Building 2 Franklin County  
(other than 1 or 2 family homes)

Occupational Title	Minimum Wage	Minimum Benefit	Total
Brickmasons And Blockmasons	\$33.00	\$4.54	\$37.54
Bulldozer Operator	\$30.00	\$7.29	\$37.29
Carpenter	\$32.59	\$12.38	\$44.97
Cement Masons And Concrete Finisher	\$24.00	\$4.90	\$28.90
Construction And Maintenance Painters	\$22.75	\$2.37	\$25.12
Construction Laborer	\$24.00	\$0.00	\$24.00
Control And Valve Installers And Repairers - Except Mechanical Door	\$31.00	\$9.86	\$40.86
Crane And Tower Operators	\$33.00	\$11.33	\$44.33
Drywall And Ceiling Tile Installers	\$26.50	\$3.91	\$30.41
Earth Drillers - Except Oil And Gas	\$28.25	\$4.94	\$33.19
Electrical Power - Line Installer And Repairers	\$54.08	\$25.81	\$79.89
Electricians	\$28.00	\$5.74	\$33.74
Elevator Installers And Repairers	\$65.62	\$44.18	\$109.80
Excavating And Loading Machine And Dragline Operators	\$24.75	\$0.00	\$24.75
Excavator Operator	\$28.00	\$2.40	\$30.40
Fence Erectors	\$24.00	\$4.59	\$28.59
Floor Layers - Except Carpet/Wood/Hard Tiles	\$24.00	\$6.32	\$30.32
Glaziers	\$24.00	\$1.50	\$25.50
Grader/Scraper Operator	\$24.76	\$3.96	\$28.72
Hazardous Materials Removal Workers	\$20.00	\$1.68	\$21.68
Heating And Air Conditioning And Refrigeration Mechanics And Installers	\$30.00	\$4.50	\$34.50
Heavy And Tractor - Trailer Truck Drivers	\$21.75	\$1.00	\$22.75
Industrial Machinery Mechanics	\$33.43	\$2.38	\$35.81
Insulation Worker - Mechanical	\$23.13	\$3.63	\$26.76
Ironworker - Ornamental	\$27.22	\$5.55	\$32.77
Light Truck Or Delivery Services Drivers	\$22.00	\$3.17	\$25.17
Millwrights	\$33.90	\$10.37	\$44.27
Mobile Heavy Equipment Mechanics - Except Engines	\$25.00	\$4.32	\$29.32
Operating Engineers And Other Equipment Operators	\$26.63	\$7.17	\$33.80
Pipelayers	\$25.50	\$3.54	\$29.04
Plasterers And Stucco Masons	\$42.18	\$19.67	\$61.85
Plumbers Pipe Fitters And Steamfitters	\$32.00	\$4.09	\$36.09
Reinforcing Iron And Rebar Workers	\$24.00	\$5.94	\$29.94
Riggers	\$28.00	\$9.74	\$37.74
Roofers	\$24.00	\$1.00	\$25.00
Sheet Metal Workers	\$23.00	\$5.38	\$28.38
Structural Iron And Steel Workers	\$32.02	\$24.67	\$56.69
Tapers	\$31.16	\$4.18	\$35.34
Telecommunications Equipment Installers And Repairers - Except Line Installers	\$28.00	\$14.01	\$42.01
Telecommunications Line Installers And Repairers	\$24.00	\$4.13	\$28.13
Tile And Marble Setters	\$25.00	\$5.05	\$30.05

Welders are classified as the trade to which welding is incidental (e.g. welding structural steel is Structural Iron and Steel Worker)

Apprentices – The minimum wage rates for registered apprentices are the rates recognized in the sponsorship agreement for registered apprentices working in the pertinent classification.

For any other specific trade on this project not listed above, contact the Bureau of Labor Standards for further clarification.

Title 26 §1310 requires that a clearly legible statement of all fair minimum wage and benefits rates to be paid the several classes of laborers, workers and mechanics employed on the construction on the public work must be kept posted in a prominent and easily accessible place at the site by each contractor and subcontractor subject to sections 1304 to 1313.

Appeal – Any person affected by the determination of these rates may appeal to the Commissioner of Labor by filing a written notice with the Commissioner stating the specific grounds of the objection within ten (10) days from the filing of these rates.

A true copy

Attest:   
Scott R. Cotnoir  
Wage & Hour Director  
Bureau of Labor Standards

Expiration Date: 12-31-2023

## **INFORMATION AVAILABLE TO BIDDERS**

### **1.1 GENERAL**

- A. Hazardous Material Information: Data in hazardous material investigation reports included herein are provided to the Contractor for information only. Conditions are not intended as representations or warranties of accuracy or continuity between sampling locations. The Owner will not be responsible for interpretations or conclusions drawn from this data by Contractor.



HALEY WARD

ENGINEERING | ENVIRONMENTAL | SURVEYING

# ASBESTOS RENOVATION IMPACT SURVEY

FOR

UNIVERSITY OF MAINE AT  
FARMINGTON  
MALLET HALL  
HIGH STREET  
FARMINGTON, MAINE

**Corporate Office**  
One Merchants Plaza  
Suite 701  
Bangor, ME 04401  
T: 207.989.4824  
F: 207.989.4881

**HALEYWARD.COM**

Prepared for: University of Maine at Farmington  
147 Farmington Falls Road  
Farmington, Maine

SEPTEMBER 6, 2023  
JN: 10028.072

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**Report Prepared By:**  
**Haley Ward, Inc.**

One Merchants Plaza, Suite 701 | Bangor, Maine 04401



## EXECUTIVE SUMMARY

Haley Ward, Inc. (Haley Ward) completed a limited asbestos-containing material (ACM) renovation impact survey on August 9, 2023, for the interior of Mallett Hall located on the campus of the University of Maine at Farmington (UMF) on High Street in Farmington, Maine. The purpose of the survey was to identify ACM which may be potentially impacted by planned renovations as identified on CHA Architecture Demolition Floor Plans, dated July 26, 2023. The survey also included an evaluation of interior roof drain systems, where accessible.

### ACM

Previously-identified ACM includes the following:

- Pipe insulation and associated mud pipe fittings;
- Mud insulated pipe fittings on fiberglass insulated piping;
- Nine-inch by nine-inch (9x9) tan floor tiles and associated adhesive
- Flooring adhesive;
- Floor tile backing; and
- Cementitious wallboard.

Previously unidentified ACM identified during this assessment includes:

Mud pipe fitting insulation associated with roof drain systems.



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<b>EXECUTIVE SUMMARY .....</b>	<b>i</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
<b>2.0 ASBESTOS CONTAINING MATERIALS .....</b>	<b>2</b>
2.1 Asbestos Renovation Impact Survey .....	2
2.2 Asbestos Sampling Results .....	3
<b>3.0 CONCLUSIONS AND RECOMMENDATIONS .....</b>	<b>4</b>
<b>4.0 REPORT CERTIFICATION.....</b>	<b>5</b>

### FIGURES

H101	Asbestos Renovation Impact Survey – Basement Plan
H102	Asbestos Renovation Impact Survey – First Floor Plan
H103	Asbestos Renovation Impact Survey – Second Floor Plan
H104	Asbestos Renovation Impact Survey – Third Floor Plan
H105	Asbestos Renovation Impact Survey – Attic Plan

### APPENDICES

Appendix A	Asbestos Inspector Certification
Appendix B	Asbestos Analytical Laboratory Certifications
Appendix C	Asbestos Laboratory Analytical Results



## 1.0 INTRODUCTION

Mallett Hall (Mallett), a student residence hall, is located on High Street on the campus of the University of Maine at Farmington (UMF) in Farmington, Maine. The building is a four-story masonry structure with dormitory rooms on the upper three floors, and offices, storage spaces, mechanical rooms, a kitchen space and a laundry area in the finished basement. The building contains an unfinished attic and a flat roof system consisting of an Ethylene Propylene Diene Monomer (EPDM) membrane roof system.

Haley Ward, Inc. (Haley Ward) reviewed available, previously completed asbestos-containing material (ACM) assessments for the building. This included a review of the Asbestos Identification Survey report by CES, Inc. (CES), dated April 6, 2015, which identified the following ACM on the interior of Mallett:

- Pipe insulation and associated mud pipe fittings;
- Mud insulated pipe fittings on fiberglass insulated piping;
- Nine-inch by nine-inch (9x9) tan floor tiles and associated adhesive
- Flooring adhesive;
- Floor tile backing; and
- Cementitious wallboard.

Haley Ward also reviewed a Hazardous Materials Assessment report by CES, dated August 21, 2018, which did not identify additional suspect ACM.

On August 9, 2023, Haley Ward completed a limited ACM renovation impact survey to identify and assess ACM which may be potentially impacted by planned renovations as identified on CHA Architecture Demolition Floor Plans, dated July 26, 2023. The survey also included an evaluation of interior roof drain systems, where accessible.

The proposed renovation areas include restroom/shower areas on the upper three floors, installation of a pipe trench in the basement, and accessibility improvements on the first floor.

Access panels located outside the restroom areas provided access to chases within the wall and ceiling systems, Haley Ward was able to observe these areas for suspect, previously unidentified ACM. The piping in these areas were observed to be either uninsulated or covered with either fiberglass or foam insulation.

Four roof drains were identified and assessed in the attic. Haley Ward assigned numbers to the roof drains for identification purposes. Refer to attached Figure H105 for roof drain locations. Vertical roof drain piping was not accessible and therefore not assessed.

The building is constructed with a flat EPDM roof system. It is not known if the original roof system was removed prior to installation of the EPDM roof system or if it was installed over the original roof. Typically, flat, asphalt built-up roof systems are suspect ACM. Should



the roof system be impacted by future renovations, the presence of the original roof should be determined and, if present, should be sampled to determine if it is asbestos-containing.

## 2.0 ASBESTOS CONTAINING MATERIALS

### 2.1 Asbestos Renovation Impact Survey

An asbestos renovation impact survey of the planned renovation areas identified by CHA in Mallett was conducted to identify previously unidentified suspect ACM, in accordance with the Maine Department of Environmental Protection (MDEP) Asbestos Management Regulations (06-096 C.M.R. Chapter 425, 2011). Ms. Deborah Kasik, a licensed State of Maine asbestos inspector, performed the field survey. A copy of Ms. Kasik's Asbestos Inspector certification is included in **Appendix A**.

Completion of the asbestos renovation impact survey included:

- Review of available, previously completed ACM assessments for the structure.
- Visual identification of suspect ACM on the interior of the building.
- Collection of twelve bulk samples of suspect ACM in accordance with MDEP regulations.
- Quantification of ACM identified by laboratory analysis.

As with any scientific study, an asbestos renovation impact survey is subject to a variety of limitations. Limitations to be considered when interpreting the results of the survey performed on the structure include the following:

- An asbestos renovation impact survey may not be able to identify all ACM present throughout a facility.
- Variations in building materials used during construction and subsequent renovations.
- Inaccessible rooms and areas within wall cavities, under floors, and above solid ceilings.

A total of twelve (12) samples of previously unidentified suspect ACM were collected from the interior of the building, including:

- Roof drain system pipe insulation
- Sheetrock wallboard (above suspended ceiling tiles)
- Waterproof coating on concrete floor
- One type of wall adhesive



The number of samples collected was determined by the number of homogeneous sampling areas identified by the inspector. A homogeneous area is an area which, based on the inspector's judgment, contains materials that are uniform in color and texture and are present on similar building or utility components.

Bulk samples of suspect ACM collected during the survey of the building were submitted to EMSL Analytical, Inc. (EMSL) of South Portland, Maine for analysis. Bulk samples were analyzed using the MDEP required analytical methods: "PLM-EPA 600/R-93/116" (for surfacing, thermal system insulation, and cementitious materials), and "PLM NOB-EPA 600/R-93/116" (for non-friable organically bound materials (NOBs)) (e.g., floor tile, adhesives, and roofing) with "gravimetric reduction." EMSL's laboratory is certified to perform asbestos analysis by both the National Voluntary Laboratory Accreditation Program (NVLAP) and the American Industrial Hygiene Association (AIHA). EMSL is a MDEP licensed Asbestos Analytical Laboratory. Copies of EMSL's laboratory certifications are included as **Appendix B**. Laboratory analytical results and chain of custodies are included as **Appendix C**.

## 2.2 Asbestos Sampling Results

According to MDEP regulations, locations and occurrences of materials that tested positive and are homogenous in nature (similar in color and texture) are considered as ACM provided the material contains greater than or equal to ( $\geq$ ) one percent asbestos based on laboratory analysis. A material can only be considered negative for asbestos if analytical results from all bulk samples in a group of samples representing that material indicate an asbestos content of less than ( $<$ ) one percent.

Laboratory analytical results identified previously unidentified materials in Mallett as asbestos-containing, including:

- Mud pipe fitting insulation associated with roof drain system.

Previously-identified ACM includes the following:

- Pipe insulation and associated mud pipe fittings;
- Mud insulated pipe fittings on fiberglass insulated piping;
- Nine-inch by nine-inch (9x9) tan floor tiles and associated adhesive
- Flooring adhesive;
- Floor tile backing; and
- Cementitious wallboard.

The sample locations and identified ACM are included on the attached **Figures H101 through H105**.



### 3.0 CONCLUSIONS AND RECOMMENDATIONS

This investigation revealed the following relevant information:

#### ACM

ACM was identified on the interior of the building, including:

- Mud pipe fitting insulation associated with roof drain systems.

Previously-identified ACM includes the following:

- Pipe insulation and associated mud pipe fittings;
- Mud insulated pipe fittings on fiberglass insulated piping;
- Nine-inch by nine-inch (9x9) tan floor tiles and associated adhesive
- Flooring adhesive;
- Floor tile backing; and
- Cementitious wallboard.

The building is constructed with a flat EPDM roof system. It is not known if the original roof system was removed prior to the installation of the EPDM roof system or if was installed over the original roof. Typically, flat, asphalt built-up roof systems are suspect ACM. Should the roof system be impacted by future renovations, the presence of the original roof should be determined and, if present, should be sampled to determine if it is ACM.

Current MDEP regulations require that identified ACM which may be impacted by planned renovation activity be removed by an MDEP licensed asbestos abatement contractor in accordance with applicable state and federal regulations prior to disturbance by such planned activities. In accordance with National Emissions Standards for Hazardous Air Pollutants (NESHAP) (40 CFR 61), and MDEP Asbestos Management Regulations, a contractor conducting any renovation and/or demolition activity that would disturb regulated ACM must: (1) notify the USEPA Administrator and the MDEP of such activities, (2) use proper removal procedures, (3) use proper engineering controls to limit emissions of asbestos fibers, and (4) utilize proper waste disposal. If any hidden suspect ACM (behind walls, in chases, above permanent ceilings, etc.) is uncovered during renovation or demolition activities, work must be stopped, and the material tested for asbestos content. All ACM must be disposed of in accordance with all applicable state and federal requirements.

Additionally, notification requirements, as required by Occupational Safety and Health Administration (OSHA) Occupational Health Standards for Asbestos (29 CFR 1910.1001 and 29 CFR 1926.1101), must be adhered to as part of routine communication with employees and outside contractors. Potential contractors bidding on renovation work must first be informed of the results of this survey. Notification regarding the presence of the ACM must also be provided to employees who occupy an area containing ACM.



#### 4.0 REPORT CERTIFICATION

This report was prepared and reviewed by Haley Ward for the use of the University of Maine at Farmington and should not be reproduced without their full, written authorization.

Deborah A. Kasik

Project Scientist II

MDEP Certified Asbestos Inspector License No. AI-0177

Michael D. Sauda, MPH, CSP

Senior Project Manager

DAK/MDS/lmb  
Attachments



## FIGURES

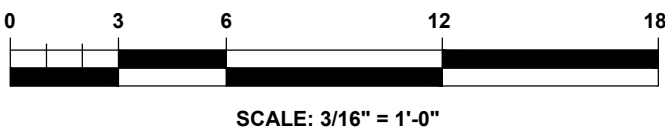
H101	ACM RENOVATION IMPACT SURVEY – BASEMENT PLAN
H102	ACM RENOVATION IMPACT SURVEY – FIRST FLOOR PLAN
H103	ACM RENOVATION IMPACT SURVEY – SECOND FLOOR PLAN
H104	ACM RENOVATION IMPACT SURVEY – THIRD FLOOR PLAN
H105	ACM RENOVATION IMPACT SURVEY – ATTIC PLAN

## ASBESTOS LEGEND

## NOTES:


1. ACM FLOOR TILE WITH ACM ADHESIVE ASSUMED IN EACH DORM ROOM ON 2ND FLOOR. ACM TILE AND ADHESIVE MAY BE LOCATED BENEATH 12" NON-ACM FLOOR TILE.
2. ACM MUD PIPE FITTINGS ARE PRESENT EITHER IN THE ROOM ITSELF OR ABOVE HARD CEILINGS.
3. ACM CEMENTITIOUS WALL BOARD MATERIAL PRESENT IN ELEVATOR SHAFT.
4. ASSUME ACM PIPE INSULATION AND MUD FITTINGS IN BOTH PIPE ENCLOSURE ABOVE CABINETS IN LAUNDRY AND SHEETROCK CEILINGS THROUGHOUT.

1. ACM FLOOR TILE WITH ACM ADHESIVE ASSUMED IN EACH DORM ROOM ON 2ND FLOOR. ACM TILE AND ADHESIVE MAY BE LOCATED BENEATH 12" NON-ACM FLOOR TILE.
2. ACM MUD PIPE FITTINGS ARE PRESENT EITHER IN THE ROOM ITSELF OR ABOVE HARD CEILINGS.
3. ACM CEMENTITIOUS WALL BOARD MATERIAL. PRESENT IN ELEVATOR SHAFT.
4. ASSUME ACM PIPE INSULATION AND MUD FITTINGS IN BOTH PIPE ENCLOSURE ABOVE CABINETS IN LAUNDRY AND SHEETROCK CEILINGS THROUGHOUT.



# BASEMENT PLAN

SCALE: 3/16"=1'-0"

REV.	DATE	DESCRIPTION	BY	CHK.		
DRAWING ISSUE STATUS						
NOT FOR CONSTRUCTION						
<div><div><div><div>HALEY WARD</div><div>ENGINEERING   ENVIRONMENTAL   SURVEYING</div><div>One Merchants Plaza, Suite 701 Bangor, Maine 04401 207.989.4824</div></div><div><a href="http://WWW.HALEYWARD.COM">WWW.HALEYWARD.COM</a></div></div></div>						
PROJECT						
UNIVERSITY OF MAINE AT FARMINGTON						
MALLETT HALL FARMINGTON, MAINE						
TITLE						
BASEMENT PLAN ACM RENOVATION IMPACT SURVEY						
	DATE		2023.09.06	SCALE	AS NOTED	
	DRAWN BY	DESIGNED BY		CHECKED BY		
	MEB		DAK		DAK	
	PROJECT No.					
	10026.072					
	DRAWING No.				REV.	
	H101					

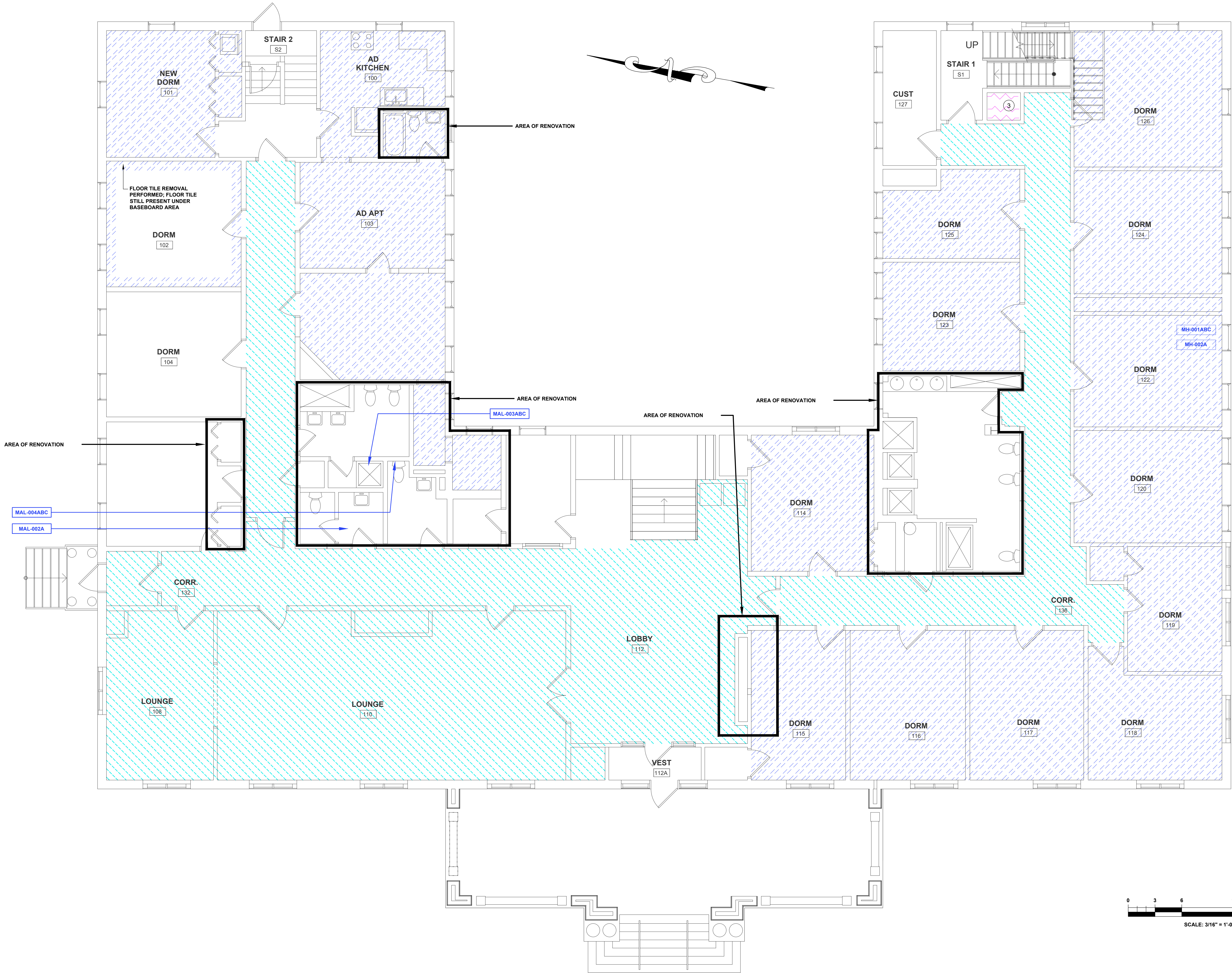
PLAN REFERENCE:  
FLOOR PLAN DERIVED FROM DRAWINGS BY OTHERS PROVIDED TO  
HALEY WARD, INC AND ARE NOT WARRANTED AS TO ACCURACY AND  
ARE INTENDED TO BE SCHEMATIC.

ASBESTOS LEGEND


- SAMPLE NUMBER AND LOCATION  
TESTING NEGATIVE FOR ASBESTOS**
- MAL-002A**
- ACM FLOOR TILE WITH ASSOCIATED ACM  
ADHESIVE UNDER NON ACM FLOOR TILE
- NON-ACM FLOOR TILE WITH ASSOCIATED  
ACM ADHESIVE UNDER CARPET
- X-3 ACM INSULATED PIPE FITTING ABOVE CEILING
- X-3 ACM INSULATED PIPE FITTING
- ACM CEMENTITIOUS WALLBOARD

NOTES:

- 1 ACM FLOOR TILE WITH ACM ADHESIVE ASSUMED IN  
EACH DORM ROOM ON 2ND FLOOR. ACM TILE AND  
ADHESIVE MAY BE LOCATED BENEATH 12" NON-ACM  
FLOOR TILE.
- 2 ACM MUD PIPE FITTINGS ARE PRESENT EITHER IN THE  
ROOM ITSELF OR ABOVE HARD CEILINGS.
- 3 ACM CEMENTITIOUS WALL BOARD MATERIAL  
PRESENT IN ELEVATOR SHAFT.
- 4 ASSUME ACM PIPE INSULATION AND MUD FITTINGS IN  
BOTH PIPE ENCLOSURE ABOVE CABINETS IN  
LAUNDRY AND SHEETROCK CEILINGS THROUGHOUT.



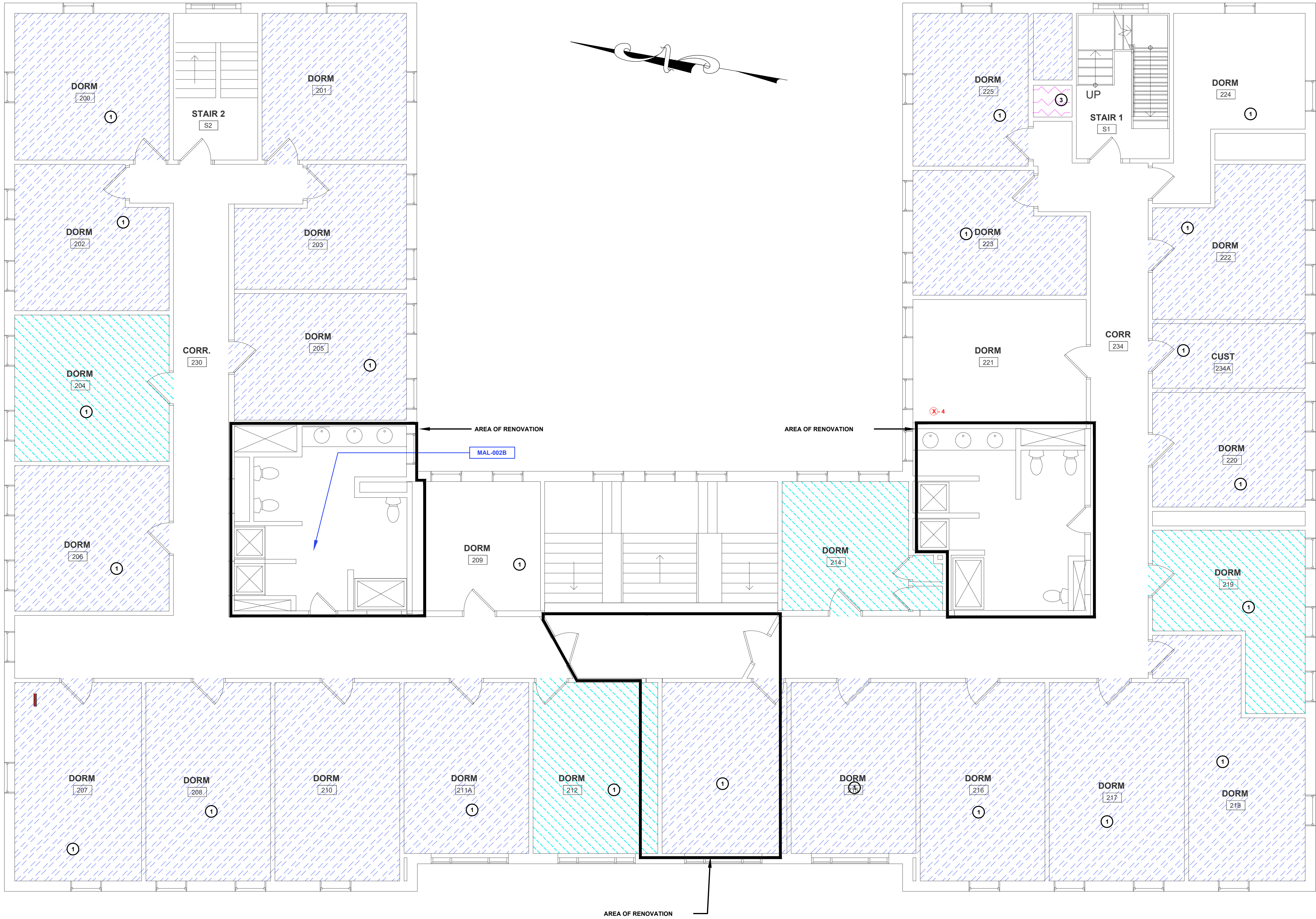
LEVEL 1 PLAN  
SCALE: 3/16"=1'-0"

REV.	DATE	DESCRIPTION	BY	CHK.
DRAWING ISSUE STATUS				
NOT FOR CONSTRUCTION				
<div><div><b>HALEY WARD</b> ENGINEERING   ENVIRONMENTAL   SURVEYING One Merchants Plaza, Suite 701 Bangor, Maine 04401 207.989.4824 <a href="http://WWW.HALEYWARD.COM">WWW.HALEYWARD.COM</a></div><div>PROJECT</div></div>				
UNIVERSITY OF MAINE AT FARMINGTON				
MALLETT HALL FARMINGTON, MAINE				
TITLE				
FIRST FLOOR PLAN ACM RENOVATION IMPACT SURVEY				
DATE		2023.09.06	SCALE	AS NOTED
DRAWN BY		MEB	DESIGNED BY	DAK
PROJECT No.		10028.072		
DRAWING No.		H102		

FILE LOCATION: P:\002\UNIVERSITY OF MAINE\_SYSTEM\ACHTHE072\JUMP ACM RENOVATION IMPACT ASSESSMENTS\0802\CAD\_FILES\ENVIRONMENTAL\MALLET HALL\REF SURVEY BASEMENT DWG. 2023.09.07. 1:25 PM

SECOND FLOOR PLAN

SCALE: 3/16"=1'-0"




**PLAN REFERENCE:**  
FLOOR PLAN DERIVED FROM DRAWINGS BY OTHERS PROVIDED TO  
HALEY WARD, INC AND ARE NOT WARRANTED AS TO ACCURACY AND  
ARE INTENDED TO BE SCHEMATIC.

**ASBESTOS LEGEND**

- MAL-002A** SAMPLE NUMBER AND LOCATION  
TESTING NEGATIVE FOR ASBESTOS
- ACM FLOOR TILE WITH ASSOCIATED  
ACM ADHESIVE
- ACM FLOOR TILE WITH ASSOCIATED ACM  
ADHESIVE UNDER NON ACM FLOOR TILE
- NON-ACM FLOOR TILE WITH ASSOCIATED  
ACM ADHESIVE UNDER CARPET
- X-3** ACM INSULATED PIPE FITTING ABOVE CEILING
- X-3** ACM INSULATED PIPE FITTING
- ACM INSULATED PIPE EXPOSED
- ACM CEMENTITIOUS WALLBOARD

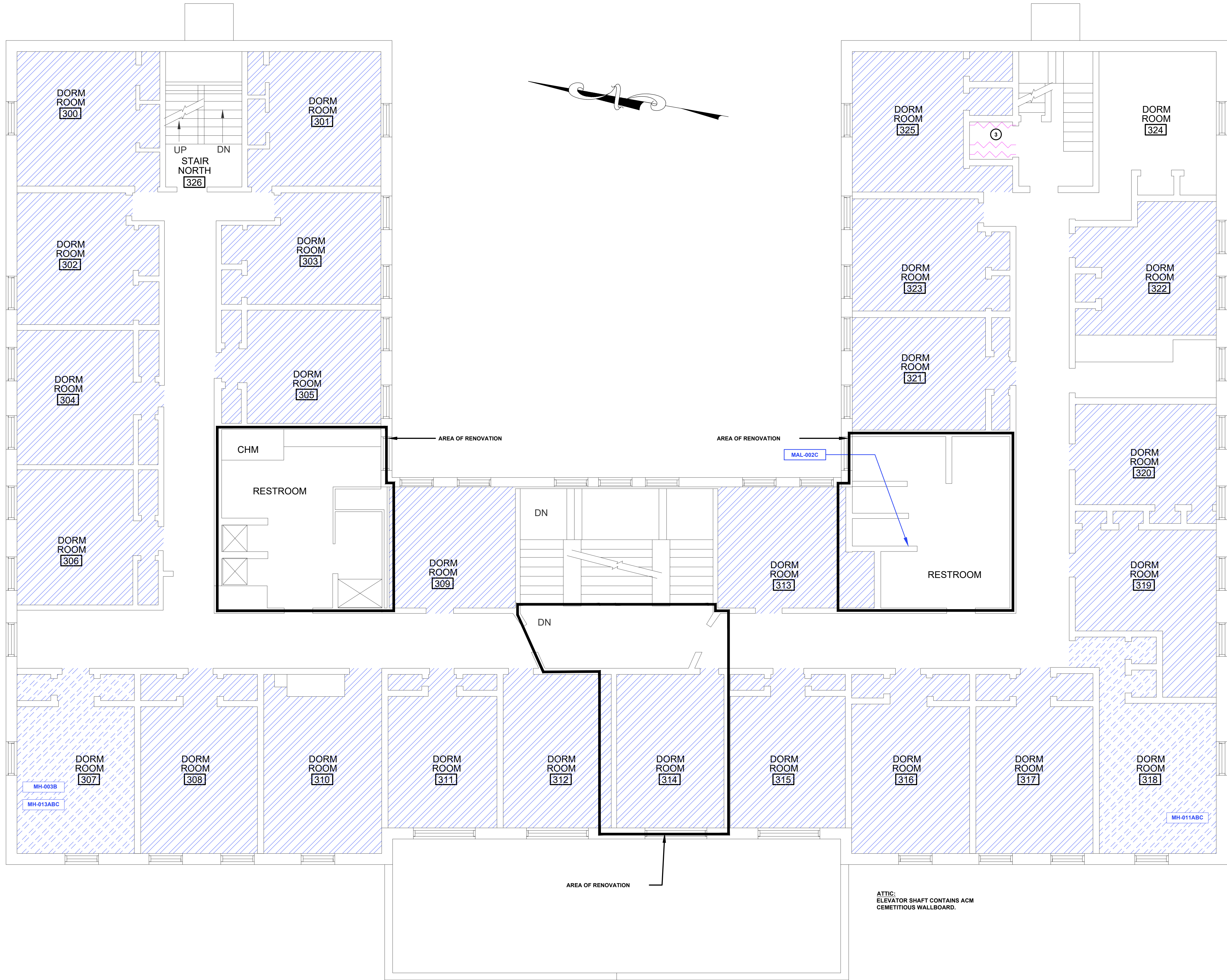
**NOTES:**

- ① ACM FLOOR TILE WITH ACM ADHESIVE ASSUMED IN  
EACH DORM ROOM ON 2ND FLOOR. ACM TILE AND  
ADHESIVE MAY BE LOCATED BENEATH 12" NON-ACM  
FLOOR TILE.
- ② ACM MUD PIPE FITTINGS ARE PRESENT EITHER IN THE  
ROOM ITSELF OR ABOVE HARD CEILINGS.
- ③ ACM CEMENTITIOUS WALL BOARD MATERIAL  
PRESENT IN ELEVATOR SHAFT.
- ④ ASSUME ACM PIPE INSULATION AND MUD FITTINGS IN  
BOTH PIPE ENCLOSURE ABOVE CABINETS IN  
LAUNDRY AND SHEETROCK CEILINGS THROUGHOUT.

REV	DATE	DESCRIPTION	BY	CHK
DRAWING ISSUE STATUS				
NOT FOR CONSTRUCTION				
<div> <b>HALEY WARD</b> ENGINEERING   ENVIRONMENTAL   SURVEYING One Merchants Plaza, Suite 701 Bangor, Maine 04401 207.989.4824</div>				
PROJECT				
UNIVERSITY OF MAINE AT FARMINGTON				
MALLETT HALL FARMINGTON, MAINE				
TITLE				
SECOND FLOOR PLAN ACM RENOVATION IMPACT SURVEY				
DATE		SCALE		
2023.09.06		AS NOTED		
DRAWN BY		DESIGNED BY		CHECKED BY
MEB		DAK		DAK
PROJECT No.				
10028.072				
DRAWING No.				REV.
H103				

FILE LOCATION: P:\002\UNIVERSITY OF MAINE\_SYSTEM\JACHTHE072\JUMP\_ACM\_RENOVATION\_IMPACT\_ASSESSMENTS\0002\CAD\_FILES\ENVIRONMENTAL\MALLETT\_HALL\002\_FLOOR SURVEY\_BASINMENT.DWG, 2023.09.07, 1:25 PM

THIRD FLOOR PLAN  
SCALE: 3/16"=1'-0"




**PLAN REFERENCE:**  
FLOOR PLAN DERIVED FROM DRAWINGS BY OTHERS PROVIDED TO HALEY WARD, INC AND ARE NOT WARRANTED AS TO ACCURACY AND ARE INTENDED TO BE SCHEMATIC.

**ASBESTOS LEGEND**

- SAMPLE NUMBER AND LOCATION TESTING NEGATIVE FOR ASBESTOS**
- MAL-002A
  - ACM FLOOR TILE WITH ASSOCIATED ACM ADHESIVE
  - ACM FLOOR TILE WITH ASSOCIATED ACM ADHESIVE UNDER NON ACM FLOOR TILE
  - ACM INSULATED PIPE FITTING ABOVE CEILING
  - ACM INSULATED PIPE FITTING
  - ACM CEMENTITIOUS WALLBOARD

**NOTES:**

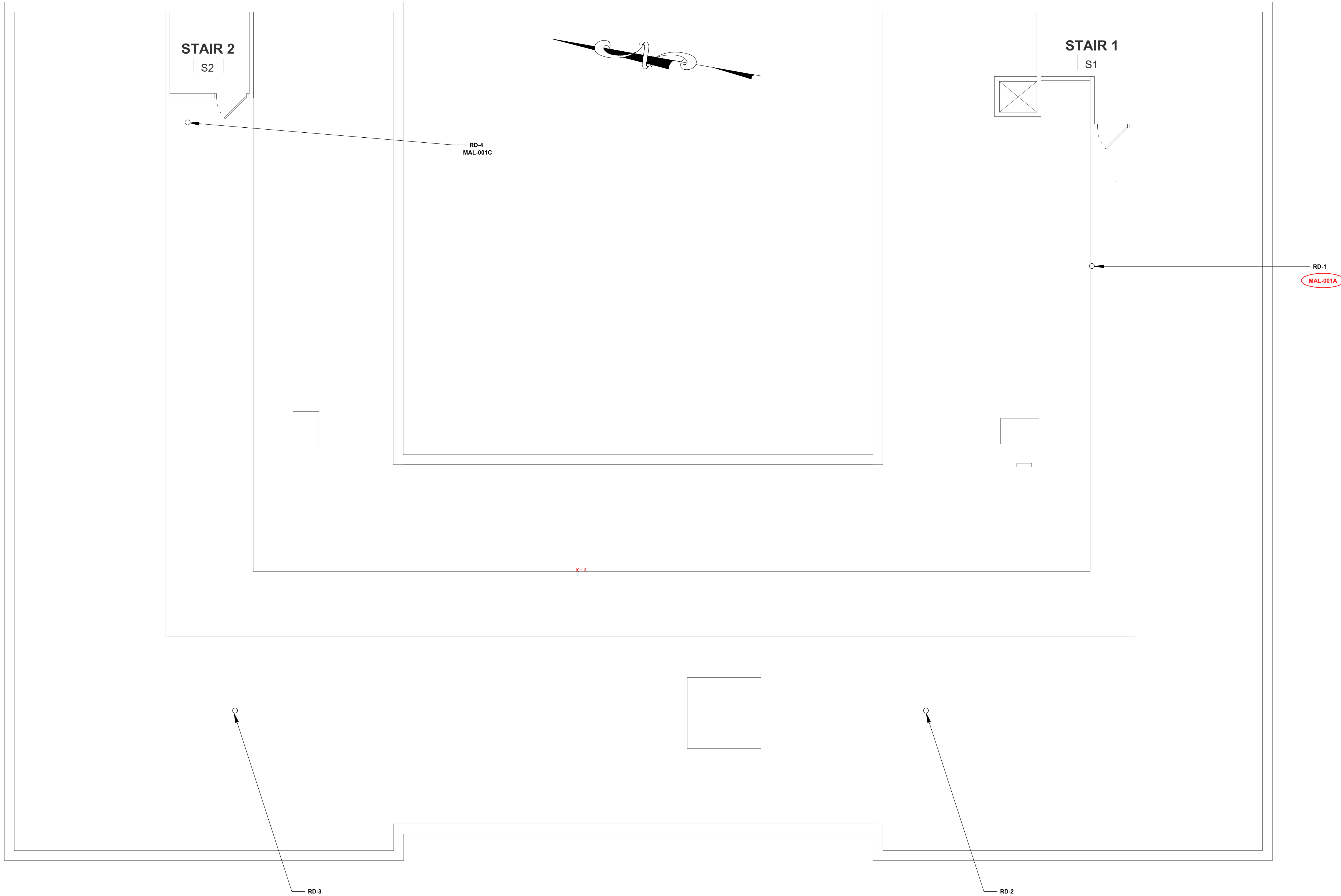
- ACM FLOOR TILE WITH ACM ADHESIVE ASSUMED IN EACH DORM ROOM ON 2ND FLOOR. ACM TILE AND ADHESIVE MAY BE LOCATED BENEATH 12" NON-ACM FLOOR TILE.
- ACM MUD PIPE FITTINGS ARE PRESENT EITHER IN THE ROOM ITSELF OR ABOVE HARD CEILINGS.
- ACM CEMENTITIOUS WALL BOARD MATERIAL PRESENT IN ELEVATOR SHAFT.
- ASSUME ACM PIPE INSULATION AND MUD FITTINGS IN BOTH PIPE ENCLOSURE ABOVE CABINETS IN LAUNDRY AND SHEETROCK CEILINGS THROUGHOUT.

REV	DATE	DESCRIPTION	BY	CHK
DRAWING ISSUE STATUS				
NOT FOR CONSTRUCTION				
<div><div><div>HALEY WARD</div><div>ENGINEERING   ENVIRONMENTAL   SURVEYING</div><div>One Merchants Plaza, Suite 701 Bangor, Maine 04401 207.989.4824</div><div>WWW.HALEYWARD.COM</div></div></div>				
PROJECT				
UNIVERSITY OF MAINE AT FARMINGTON				
MALLET HALL FARMINGTON, MAINE				
TITLE				
THIRD FLOOR PLAN ACM RENOVATION IMPACT SURVEY				
DATE		SCALE		
2023.09.06		AS NOTED		
DRAWN BY		DESIGNED BY		CHECKED BY
MEB		DAK		DAK
PROJECT No.				
10028.072				
DRAWING No.				REV.
H104				

FILE LOCATION: P:\002\UNIVERSITY OF MAINE\_SYSTEM\_FACILITIES\072\UMF ACM RENOVATION IMPACT ASSESSMENTS\0802\CAD\_FILES\ENVIRONMENTAL\MALLETT HALL\REF SURVEY BASEMENT DWG, 2023.09.07, 1:25 PM

ATTIC PLAN

SCALE: 3/16"=1'-0"




ATTIC:  
ELEVATOR SHAFT CONTAINS ACM  
CEMENTITIOUS WALLBOARD.

**PLAN REFERENCE:**  
FLOOR PLAN DERIVED FROM DRAWINGS BY OTHERS PROVIDED TO  
HALEY WARD, INC AND ARE NOT WARRANTED AS TO ACCURACY AND  
ARE INTENDED TO BE SCHEMATIC.

ASBESTOS LEGEND

- PUR-001A** SAMPLE NUMBER AND LOCATION  
TESTING POSITIVE FOR ASBESTOS
- PUR-001B** SAMPLE NUMBER AND LOCATION  
NOT ANALYZED (POSITIVE STOP)
- X-3** ACM INSULATED PIPE FITTING
- RD-1** ROOF DRAIN & NUMBER

REV.	DATE	DESCRIPTION	BY	CHK.
DRAWING ISSUE STATUS				
NOT FOR CONSTRUCTION				
 <b>HALEY WARD</b> ENGINEERING   ENVIRONMENTAL   SURVEYING One Merchants Plaza, Suite 701 Bangor, Maine 04401 207.989.4824 <a href="http://WWW.HALEYWARD.COM">WWW.HALEYWARD.COM</a>				
PROJECT				
UNIVERSITY OF MAINE AT FARMINGTON MALLETT HALL FARMINGTON, MAINE				
TITLE				
ATTIC PLAN ACM RENOVATION IMPACT SURVEY				
DATE 2023.09.06		SCALE AS NOTED		
DRAWN BY MEB	DESIGNED BY DAK	CHECKED BY DAK		
PROJECT No. 10028.072				
DRAWING No. <b>H105</b>				REV.



## APPENDIX A

### ASBESTOS INSPECTOR CERTIFICATION



JANET T. MILLS  
GOVERNOR

STATE OF MAINE  
DEPARTMENT OF ENVIRONMENTAL PROTECTION



MELANIE LOYZIM  
COMMISSIONER

December 4, 2022

**Haley Ward, Inc.**  
1 Merchants Plaza, Suite 701  
Bangor, Maine 04401

Dear Licensee:

Asbestos application(s) for individual certification of the **two** employee(s) listed below have been received and **approved**. Individual certification numbers are listed below and wallet card(s) are enclosed. Card(s) are property of the individual to whom each is issued. Your responsibility as a licensee is to ensure delivery of the cards to persons in your employment. This letter should be retained for your company files as record of certification. Please attach 1 updated passport size photo with every application.

**Remember**, in Maine all **certified employees** working on an asbestos abatement project, whether conducting removal/repair, air monitoring, design, inspection, or analysis functions, **must work for a State of Maine licensed asbestos firm** and carry his/her wallet card(s) on the job site.

As a reminder, prior to renewing your asbestos certification, the State of Maine **requires** an annual refresher course to be taken before submitting a renewal application. A certificate shall expire one year from the last day of the month from the date of issuance, **or on the last day of the month that the training certificate expires**, whichever is sooner.

All our asbestos forms can be found at <https://www.maine.gov/dep/waste/asbestos/forms.html>  
Thank you for your cooperation and your completed application(s).

<u>Name</u>	<u>Category</u>	<u>Certification #</u>	<u>Exp. Date</u>
Deborah A. Kasik	Inspector	AI-0177	11/30/2023
Dennis B. Kingman, Jr.	Inspector	AI-0034	11/30/2023

Sincerely,

*Sandra J. Moody*

Sandra J. Moody, Environmental Specialist  
Division of Remediation  
Bureau of Remediation and Waste Management

State of Maine  
Asbestos Abatement Program

Deborah A. Kasik

Inspector

Cert No. AI-0177

Trn.Exp.Date 11/10/2023

Expiration Date 11/30/2023

This is not a legal form of official identification



AUGUSTA  
17 STATE HOUSE STATION  
AUGUSTA, MAINE 04333-0017  
(207) 287-7688 FAX: (207) 287-7826

BANGOR  
106 HOGAN ROAD, SUITE 6  
BANGOR, MAINE 04401  
(207) 941-4570 FAX: (207) 941-4584

PORTLAND  
312 CANCO ROAD  
PORTLAND, MAINE 04106  
(207) 822-6300 FAX: (207) 822-6303 (207) 764-0477 FAX: (207) 760-3143



## APPENDIX B

### ASBESTOS ANALYTICAL LABORATORY CERTIFICATIONS



STATE OF MAINE  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS  
GOVERNOR

MELANIE LOYZIM  
COMMISSIONER

September 14, 2022

Attn: Lorie Dennis, | Quality Assurance Administrative Assistant  
EMSL Analytical, Inc.  
200 Route 130 North  
Cinnaminson, NJ 08077

Dear Ms. Dennis,

This is to confirm that the Maine Department of Environmental Protection is in receipt of your request to add the following labs to your licensing of Analytical Laboratories: Boston, MA., **South Portland, Maine** and Wallingford, CT.

LA-0038 for Asbestos Analytical Laboratory (Air), expires on 10/31/2023  
LB-0039 for Asbestos Analytical Laboratory (Bulk), expires on 10/31/2023

Remember each laboratory must have certified individual(s) within the lab to perform analyses.

If you need any further assistance please feel free to contact me at (207) 242-0877 or e-mail at [sandy.j.moody@maine.gov](mailto:sandy.j.moody@maine.gov).

Sincerely,

Sandra J. Moody, Environmental Specialist  
Division of Remediation  
Bureau of Remediation and Waste Management

AUGUSTA  
17 STATE HOUSE STATION  
AUGUSTA, MAINE 04333-0017  
(207) 287-7688 FAX: (207) 287-7826  
RAY BLDG., HOSPITAL ST.

BANGOR  
106 HOGAN ROAD, SUITE 6  
BANGOR, MAINE 04401  
(207) 941-4570 FAX: (207) 941-4584

PORTLAND  
312 CANCO ROAD  
PORTLAND, MAINE 04103  
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE  
1235 CENTRAL DRIVE, SKYWAY PARK  
PRESQUE ISLE, MAINE 04679-2094  
(207) 764-0477 FAX: (207) 760-3143



State of Maine  
Department of Environmental Protection

*LICENSE*

EMSL Analytical, Inc.

Asbestos Analytical Laboratory  
(Bulk)

License Number: LB-0039

Expiration Date: 10/31/2023



State of Maine  
Department of Environmental Protection

*LICENSE*

EMSL Analytical, Inc.

Asbestos Analytical Laboratory  
(Air)

License Number: LA-0038

Expiration Date: 10/31/2023

# S. PORTLAND - INDIVIDUAL ANALYST CERTIFICATIONS

## State of Maine

May 12, 2023

<i><b>Employee Name</b></i>	<i><b>Lab Location</b></i>	<i><b>State Certified</b></i>	<i><b>Certification No.</b></i>	<i><b>Type of Cert.</b></i>	<i><b>Exp. Date</b></i>
Stephen Severn	S. Portland	Maine	AA-0497	Air Asbestos Analyst	11/30/2023
Stephen Severn	S. Portland	Maine	BA-0178	Bulk Asbestos Analyst	11/30/2023
Stefan Reis	S. Portland	Maine	BA-0233	Bulk Asbestos Analyst	5/31/2024

United States Department of Commerce  
National Institute of Standards and Technology



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## Certificate of Accreditation to ISO/IEC 17025:2017

---

NVLAP LAB CODE: 500094-0

**EMSL Analytical, Inc.**  
South Portland, ME

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:*

### **Asbestos Fiber Analysis**

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

---

2022-10-01 through 2023-09-30

*Effective Dates*



---

*Dana S. Gorman*  
For the National Voluntary Laboratory Accreditation Program

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017**

**EMSL Analytical, Inc.**

161 John Roberts Road  
South Portland, ME 04106

Ms. Samantha Voigt

Phone: 207-517-6921

Email: [svoigt@emsl.com](mailto:svoigt@emsl.com)

<http://www.emsl.com>

**ASBESTOS FIBER ANALYSIS**

**NVLAP LAB CODE 500094-0**

**Bulk Asbestos Analysis**

**Code**

**Description**

18/A01

EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples

18/A03

EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials

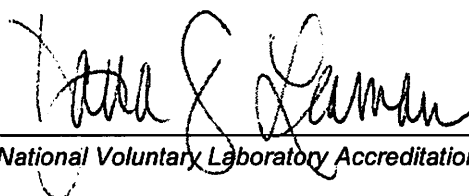
**Airborne Asbestos Analysis**

**Code**

**Description**

18/A02

U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A.



*For the National Voluntary Laboratory Accreditation Program*



## AIHA Laboratory Accreditation Programs, LLC

*acknowledges that*

**EMSL Analytical, Inc.**

**200 Route 130 North Cinnaminson, NJ 08077**

**Laboratory ID: LAP-100194**

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA LAP), LLC accreditation to the ISO/IEC 17025:2017 international standard, General Requirements for the Competence of Testing and Calibration Laboratories in the following:

### LABORATORY ACCREDITATION PROGRAMS

<input checked="" type="checkbox"/>	INDUSTRIAL HYGIENE	Accreditation Expires: January 01, 2025
<input checked="" type="checkbox"/>	ENVIRONMENTAL LEAD	Accreditation Expires: January 01, 2025
<input checked="" type="checkbox"/>	ENVIRONMENTAL MICROBIOLOGY	Accreditation Expires: January 01, 2025
<input type="checkbox"/>	FOOD	Accreditation Expires:
<input type="checkbox"/>	UNIQUE SCOPES	Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached Scope of Accreditation. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2017 and AIHA LAP, LLC requirements. This certificate is not valid without the attached Scope of Accreditation. Please review the AIHA LAP, LLC website ([www.aihaaccreditedlabs.org](http://www.aihaaccreditedlabs.org)) for the most current Scope.

A handwritten signature in black ink that reads 'Cheryl O. Morton'.

Cheryl O Morton  
Managing Director, AIHA Laboratory Accreditation Programs, LLC



# AIHA Laboratory Accreditation Programs, LLC

## SCOPE OF ACCREDITATION

**EMSL Analytical, Inc.**

200 Route 130 North Cinnaminson, NJ 08077

**Laboratory ID: LAP-100194**

Issue Date: 01/01/2023

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

### Industrial Hygiene Laboratory Accreditation Program (IHLAP)

**Initial Accreditation Date: 02/01/1989**

IHLAP Scope Category	Field of Testing (FOT)	Technology sub-type/Detector	Published Reference Method/Title of In-house Method	Component, parameter or characteristic tested
Asbestos/Fiber Microscopy Core	Phase Contrast Microscopy (PCM)	-	NIOSH 7400	Asbestos/Fibers
Asbestos/Fiber Microscopy Core	Polarized Light Microscopy (PLM)	-	EPA 600/R-93/116	Asbestos & Other Fibers in Bulk
Asbestos/Fiber Microscopy Core	Transmission Electron Microscopy (TEM)	-	EPA AHERA - 40 CFR Part 763	Asbestos
Asbestos/Fiber Microscopy Core	Transmission Electron Microscopy (TEM)	-	NIOSH 7402	Asbestos/Fibers
Chromatography Core	GC/MS	-	EPA TO-15	Volatile Organic Compounds
Chromatography Core	Gas Chromatography	GC/ECD	NIOSH 5502 Modified	Aldrin & Lindane
Chromatography Core	Gas Chromatography	GC/ECD	NIOSH 5503 Modified	Polychlorinated biphenyls
Chromatography Core	Gas Chromatography	GC/ECD	NIOSH 5510 Modified	Chlordane
Chromatography Core	Gas Chromatography	GC/FID	NIOSH 1003 Modified	Halogenated Hydrocarbons
Chromatography Core	Gas Chromatography	GC/FID	NIOSH 1005 Modified	Methylene Chloride
Chromatography Core	Gas Chromatography	GC/FID	NIOSH 1400 Modified	Alcohols
Chromatography Core	Gas Chromatography	GC/FID	NIOSH 1500 Modified	Hydrocarbons
Chromatography Core	Gas Chromatography	GC/FID	NIOSH 1501 Modified	Aromatic Hydrocarbons
Chromatography Core	Gas Chromatography	GC/FID	NIOSH 1550 Modified	Total Petroleum Hydrocarbons
Chromatography Core	Gas Chromatography	GC/FID	NIOSH 1603 Modified	Acetic Acid
Chromatography Core	Gas Chromatography	GC/FID	NIOSH 2000 Modified	Methyl Alcohol
Chromatography Core	Gas Chromatography (Diffusive Samplers)	-	NIOSH 1501	Aromatic Hydrocarbons

Effective: 06/07/2022

Revision: 9.2

Page 1 of 2



IHLAP Scope Category	Field of Testing (FOT)	Technology sub-type/Detector	Published Reference Method/Title of In-house Method	Component, parameter or characteristic tested
Chromatography Core	Ion Chromatography (IC)	-	NIOSH 6004 Modified	Sulfur Dioxide/Sulfate
Chromatography Core	Ion Chromatography (IC)	-	NIOSH 6011	Chlorine & Bromine
Chromatography Core	Ion Chromatography (IC)	-	NIOSH 7903	Inorganic Acids
Chromatography Core	Ion Chromatography (IC)	-	OSHA ID-214	Ozone
Chromatography Core	Ion Chromatography (IC)	-	OSHA ID-215 (Version 2) Modified	Hexavalent Chromium
Chromatography Core	Liquid Chromatography	HPLC/FL	NIOSH 2016	Formaldehyde
Chromatography Core	Liquid Chromatography	HPLC/UV	NIOSH 5506 Modified	Polynuclear Aromatic Hydrocarbons (PAHs)
Chromatography Core	Liquid Chromatography	LC/MS	NIOSH 9111 Modified	Methamphetamines
Miscellaneous Core	Gravimetric	-	NIOSH 0500	Total Dust
Miscellaneous Core	Gravimetric	-	NIOSH 0600	Respirable Dust
Miscellaneous Core	Gravimetric	-	NIOSH 5524	Metal Working Fluids
Miscellaneous Core	Thermo-optical Analysis (TOA)	-	NIOSH 5040	Elemental Carbon
Spectrometry Core	Atomic Absorption	CVAA	NIOSH 6009 Modified	Mercury
Spectrometry Core	Atomic Absorption	CVAA	OSHA ID-140 Modified	Mercury vapor
Spectrometry Core	Atomic Absorption	CVAA	OSHA ID-145	Mercury particulate
Spectrometry Core	Atomic Absorption	FAA	NIOSH 7082	Lead
Spectrometry Core	Inductively-Coupled Plasma	ICP/AES	NIOSH 7300 Modified	Lead
Spectrometry Core	Inductively-Coupled Plasma	ICP/MS	NIOSH 7300 Modified	Lead
Spectrometry Core	UV/VIS (Colorimetric)	-	NIOSH 6010	Hydrogen Cyanide
Spectrometry Core	X-ray Diffraction (XRD)	-	NIOSH 7500	Silica
Spectrometry Core	X-ray Diffraction (XRD)	-	OSHA ID-142	Silica

A complete listing of currently accredited IHLAP laboratories is available on the AIHA LAP, LLC website at: <http://www.aihaaccreditedlabs.org>



## AIHA Laboratory Accreditation Programs, LLC

*acknowledges that*

**EMSL Analytical, Inc.**

**200 Route 130 North Cinnaminson, NJ 08077**

**Laboratory ID: LAP-100194**

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA LAP), LLC accreditation to the ISO/IEC 17025:2017 international standard, General Requirements for the Competence of Testing and Calibration Laboratories in the following:

### LABORATORY ACCREDITATION PROGRAMS

<input checked="" type="checkbox"/>	INDUSTRIAL HYGIENE	Accreditation Expires: January 01, 2025
<input checked="" type="checkbox"/>	ENVIRONMENTAL LEAD	Accreditation Expires: January 01, 2025
<input checked="" type="checkbox"/>	ENVIRONMENTAL MICROBIOLOGY	Accreditation Expires: January 01, 2025
<input type="checkbox"/>	FOOD	Accreditation Expires:
<input type="checkbox"/>	UNIQUE SCOPES	Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached Scope of Accreditation. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2017 and AIHA LAP, LLC requirements. This certificate is not valid without the attached Scope of Accreditation. Please review the AIHA LAP, LLC website ([www.aihaaccreditedlabs.org](http://www.aihaaccreditedlabs.org)) for the most current Scope.

A handwritten signature in black ink that reads 'Cheryl O. Morton'.

Cheryl O Morton  
Managing Director, AIHA Laboratory Accreditation Programs, LLC



## AIHA Laboratory Accreditation Programs, LLC

### SCOPE OF ACCREDITATION

#### EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077

Laboratory ID: LAP-100194

Issue Date: 01/01/2023

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

The EPA recognizes the AIHA LAP, LLC ELLAP program as meeting the requirements of the National Lead Laboratory Accreditation Program (NLLAP) established under Title X of the Residential Lead-Based Paint Hazard Reduction Act of 1992 and includes paint, soil and dust wipe analysis. Air and composited wipes analyses are not included as part of the NLLAP.

#### Environmental Lead Laboratory Accreditation Program (ELLAP)

Initial Accreditation Date: 01/18/1995

Component, parameter or characteristic tested	Technology sub-type/Detector	Method	Method Description (for internal methods only)
Airborne Dust	AA	NIOSH 7082	N/A
Composited Wipes	AA	EPA SW-846 3050B	N/A
		EPA SW-846 7000B	N/A
Paint	AA	EPA SW-846 3050B	N/A
		EPA SW-846 7000B	N/A
Settled Dust by Wipe	AA	EPA SW-846 3050B	N/A
		EPA SW-846 7000B	N/A
Soil	AA	EPA SW-846 3050B	N/A
		EPA SW-846 7000B	N/A

A complete listing of currently accredited ELLAP laboratories is available on the AIHA LAP, LLC website at:  
<http://www.aihaaccreditedlabs.org>



## AIHA Laboratory Accreditation Programs, LLC

*acknowledges that*

**EMSL Analytical, Inc.**

**200 Route 130 North Cinnaminson, NJ 08077**

**Laboratory ID: LAP-100194**

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs (AIHA LAP), LLC accreditation to the ISO/IEC 17025:2017 international standard, General Requirements for the Competence of Testing and Calibration Laboratories in the following:

### LABORATORY ACCREDITATION PROGRAMS

<input checked="" type="checkbox"/>	INDUSTRIAL HYGIENE	Accreditation Expires: January 01, 2025
<input checked="" type="checkbox"/>	ENVIRONMENTAL LEAD	Accreditation Expires: January 01, 2025
<input checked="" type="checkbox"/>	ENVIRONMENTAL MICROBIOLOGY	Accreditation Expires: January 01, 2025
<input type="checkbox"/>	FOOD	Accreditation Expires:
<input type="checkbox"/>	UNIQUE SCOPES	Accreditation Expires:

Specific Field(s) of Testing (FoT)/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached Scope of Accreditation. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2017 and AIHA LAP, LLC requirements. This certificate is not valid without the attached Scope of Accreditation. Please review the AIHA LAP, LLC website ([www.aihaaccreditedlabs.org](http://www.aihaaccreditedlabs.org)) for the most current Scope.

A handwritten signature in black ink that reads 'Cheryl O. Morton'.

Cheryl O Morton  
Managing Director, AIHA Laboratory Accreditation Programs, LLC



# AIHA Laboratory Accreditation Programs, LLC

## SCOPE OF ACCREDITATION

**EMSL Analytical, Inc.**

200 Route 130 North Cinnaminson, NJ 08077

**Laboratory ID: LAP-100194**

Issue Date: 01/01/2023

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

### Environmental Microbiology Laboratory Accreditation Program (EMLAP)

**Initial Accreditation Date: 09/01/2002**

EMLAP Scope Category	Field of Testing (FOT)	Component, parameter or characteristic tested	Method	Method Description (for internal methods only)
Bacterial	Air - Culturable	Air	MICRO-SOP-132	Detection and Enumeration of Culturable Bacteria from Environmental Samples
Bacterial	Bulk - Culturable	Bulks (liquid or solid)	MICRO-SOP-132	Detection and Enumeration of Culturable Bacteria from Environmental Samples
Bacterial	Legionella	Water, Swabs, Soil and Air	MICRO-SOP-105	ISO 11731:2017
Bacterial	Legionella	Water, Swabs, Soil and Air	MICRO-SOP-105-3	Recovery of Legionella from the Environment Using the Center for Disease Control and Prevention's Culture Method
Bacterial	Surface - Culturable	Swab or Contact Plate	MICRO-SOP-132	Detection and Enumeration of Culturable Bacteria from Environmental Samples
Fungal	Air - Culturable	Air	MICRO-SOP-202	Detection and Enumeration of Culturable Fungi from Environmental Samples
Fungal	Air - Direct Examination	Spore Trap	MICRO-SOP-201	Identification and Quantification of Airborne Fungal Spores, Hyphal Fragments, Pollen, Insect Fragments, Skin Fragments and Fibrous Particulate by Optical Microscopy of Spore Trap Samples
Fungal	Bulk - Culturable	Bulks (liquid or solid)	MICRO-SOP-202	Detection and Enumeration of

Effective: 06/07/2022

Revision: 7.2

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EMLAP Scope Category	Field of Testing (FOT)	Component, parameter or characteristic tested	Method	Method Description (for internal methods only)
				Culturable Fungi from Environmental Samples
Fungal	Bulk - Direct Examination	Bulks (liquid or solid)	MICRO-SOP-200	Microscopic Examination of Fungal Spores, Fungal Structures, Hyphae, Pollen, Insect Fragments, and Fibrous Particulate from Surface Samples
Fungal	Surface - Culturable	Swab or Contact Plate	MICRO-SOP-202	Detection and Enumeration of Culturable Fungi from Environmental Samples
Fungal	Surface - Direct Examination	Swab or Tape Lift	MICRO-SOP-200	Microscopic Examination of Fungal Spores, Fungal Structures, Pollen, Insect Fragments and Fibrous Particulate from Surface Samples
Molecular	PCR - Bacteriodes	Water, Swabs, Bulks and Soil	M095	Procedure for Rapid Identification of Total Bacteriodes by TaqMan Real-Time PCR
Molecular	PCR - Human Bacteriodes	Water, Swabs, Bulks and Soil	M199	SOP for Rapid Identification of Human Bacteriodes by TaqMan Real-Time PCR
Molecular	qPCR - Legionella pneumophila	Water, Swabs, Bulks	PCR-SOP-127	SOP for Identification and Quantification of Legionella Species, Legionella pneumophila and Legionella pneumophila Serogroup 1 by Real-Time Quantitative PCR (qPCR)
Molecular	qPCR - Mold Specific qPCR	Dust, Swab, Bulk, Water and Air	PCR-SOP-202	SOP for Identification and Quantitation of Fungi by Real-Time Mold Specific Quantitative PCR (MSQPCR)

A complete listing of currently accredited EMLAP laboratories is available on the AIHA LAP, LLC website at:  
<http://www.aihaaccreditedlabs.org>



## APPENDIX C

### ASBESTOS LABORATORY ANALYTICAL RESULTS



# EMSL Analytical, Inc.

161 John Roberts Road South Portland, ME 04106  
Phone/Fax: (207) 517-6921 / (207) 517-6922  
<http://www.EMSL.com> / [portlandlab@emsl.com](mailto:portlandlab@emsl.com)

EMSL Order ID: 622300917  
Customer ID: CESI62  
Customer PO:  
Project ID:

**Attn:** Deb Kasik  
Haley Ward  
1 Merchant's Plaza  
7th Floor  
Bangor, ME 04401

**Phone:** (207) 989-4824  
**Fax:** (207) 989-4881  
**Collected:** 8/21/2023  
**Received:** 8/21/2023  
**Analyzed:** 8/25/2023

**Proj:** 10028.072 Mallet

## Summary Test Report for Asbestos Analysis of Bulk Material

**Client Sample ID:** MAL-001A

**Lab Sample ID:** 622300917-0001

**Sample Description:** Attic/Roof Drain Cover

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	8/25/2023	White	0.0%	49.1%	50.9% Chrysotile	

**Client Sample ID:** MAL-001B

**Lab Sample ID:** 622300917-0002

**Sample Description:** Attic/Roof Drain Cover

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	8/25/2023					Positive Stop (Not Analyzed)

**Client Sample ID:** MAL-001C

**Lab Sample ID:** 622300917-0003

**Sample Description:** Attic/Roof Drain Cover

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	8/25/2023					Positive Stop (Not Analyzed)

**Client Sample ID:** MAL-002A

**Lab Sample ID:** 622300917-0004

**Sample Description:** 1st Bath/Sheetrock

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/25/2023	Brown/White	18.0%	82.0%	None Detected	

**Client Sample ID:** MAL-002B

**Lab Sample ID:** 622300917-0005

**Sample Description:** 2nd Bath/Sheetrock

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/25/2023	Brown/White	18.0%	82.0%	None Detected	

**Client Sample ID:** MAL-002C

**Lab Sample ID:** 622300917-0006

**Sample Description:** 3rd Bath/Sheetrock

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM	8/25/2023	Brown/White	20.0%	80.0%	None Detected	

**Client Sample ID:** MAL-003A

**Lab Sample ID:** 622300917-0007

**Sample Description:** 1st FI Bath/Shower Floor Coating

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	8/25/2023	Gray	0.0%	100%	None Detected	



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<http://www.EMSL.com> / [portlandlab@emsl.com](mailto:portlandlab@emsl.com)

EMSL Order ID: 622300917  
Customer ID: CESI62  
Customer PO:  
Project ID:

## Summary Test Report for Asbestos Analysis of Bulk Material

**Client Sample ID:** MAL-003B **Lab Sample ID:** 622300917-0008

**Sample Description:** 1st FI Bath/Shower Floor Coating

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	8/25/2023	Gray	0.0%	100%	None Detected	

**Client Sample ID:** MAL-003C **Lab Sample ID:** 622300917-0009

**Sample Description:** 1st FI Bath/Shower Floor Coating

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	8/25/2023	Gray	0.0%	100%	None Detected	

**Client Sample ID:** MAL-004A **Lab Sample ID:** 622300917-0010

**Sample Description:** 1st FI Bath (Wall)/Cer. Tile Adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	8/25/2023	Gray	1.1%	98.9%	None Detected	

**Client Sample ID:** MAL-004B **Lab Sample ID:** 622300917-0011

**Sample Description:** 1st FI Bath (Wall)/Cer. Tile Adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	8/25/2023	Gray	0.75%	99.2%	None Detected	

**Client Sample ID:** MAL-004C **Lab Sample ID:** 622300917-0012

**Sample Description:** 1st FI Bath (Wall)/Cer. Tile Adhesive

TEST	Analyzed Date	Color	Non-Asbestos		Asbestos	Comment
			Fibrous	Non-Fibrous		
PLM Grav. Reduction	8/25/2023	Gray	1.7%	98.3%	None Detected	



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EMSL Order ID: 622300917  
Customer ID: CESI62  
Customer PO:  
Project ID:

### Summary Test Report for Asbestos Analysis of Bulk Material

---

PLM: ME CERT # BA-0205, BA-0229

PLM EPA NOB: ME CERT # BA-0205, BA-0229

#### Analyst(s):

---

Gregory Barry	PLM (2) PLM Grav. Reduction (5)
Julianna Hosbach	PLM (1) PLM Grav. Reduction (2)

#### Reviewed and approved by:

---

Stephen Severn, Technical Manager  
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This is a summary report; official reports are available on LabConnect or upon request and relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by EMSL Analytical, Inc. South Portland, ME NVLAP Lab Code 500094-0, VT AL197271, ME LM-0039, CT PH-0346, AZ AZ-0959, MA AA000236

Initial report from: 08/25/2023 17:23:38



EMSL ANALYTICAL, INC.  
LABORATORY • PRODUCTS • TRAINING

# Asbestos Bulk Building Materials - Chain of Custody

EMSL Order Number / Lab Use Only

EMSL Analytical, Inc.  
161 John Roberts Road

South Portland, ME 04106

PHONE: (207) 517-6921

EMAIL: portlandlab@emsl.com

622300917

Customer ID:		Billing ID:	
Company Name: Haley Ward		Company Name: Haley Ward	
Contact Name: Deb Kasik		Billing Contact: Deb Kasik	
Street Address: 1 Merchant's Plaza 7th Floor		Street Address: 1 Merchant's Plaza, 7th Floor	
City, State, Zip: Bangor ME 04401	Country: US	City, State, Zip: Bangor ME	Country: US
Phone: 207-989-4824		Phone: 207-989-4824	
Email(s) for Report: dkasik@haleyward.com		Email(s) for Invoice:	

Project Name/No. 16028-072 Mallet		Purchase Order:	
EMSL LIMS Project ID: (If applicable, EMSL will provide)		US State where samples collected: ME	
State of Connecticut (CT) must select project location: <input type="checkbox"/> Commercial (Taxable) <input type="checkbox"/> Residential (Non-Taxable)		Date Sampled	
Sampled By Name: Deb Kasik		No. of Samples in Shipment: 12	
Sampled By Signature: <i>Deb Kasik</i>		Turn-Around-Time (TAT): <input type="checkbox"/> 3 Hour <input type="checkbox"/> 6 Hour <input type="checkbox"/> 24 Hour <input type="checkbox"/> 32 Hour <input type="checkbox"/> 48 Hour <input type="checkbox"/> 72 Hour <input checked="" type="checkbox"/> 96 Hour <input type="checkbox"/> 1 Week <input type="checkbox"/> 2 Week	

<b>PLM - Bulk (reporting limit)</b> <input checked="" type="checkbox"/> PLM EPA 600/R-93/116 (<1%) <input checked="" type="checkbox"/> PLM EPA NOB (<1%) <input type="checkbox"/> POINT COUNT <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1,000 (<0.1%) <input type="checkbox"/> POINT COUNT w/ GRAVIMETRIC <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1,000 (<0.1%) <input type="checkbox"/> NIOSH 9002 (<1%) <input type="checkbox"/> NYS 198.1 (Friable - NY) <input type="checkbox"/> NYS 198.6 NOB (Non-Friable - NY) <input type="checkbox"/> NYS 198.8 (Vermiculite SM-V)		<b>TEM - Bulk</b> <input type="checkbox"/> TEM EPA NOB <input type="checkbox"/> NYS NOB 198.4 (Non-Friable - NY) <input type="checkbox"/> TEM EPA 600/R-93/116 (Friable - NY) <b>Other Tests (please specify):</b>	
<b>Test Selection</b> <input checked="" type="checkbox"/> Positive Stop - Clearly Identified Homogeneous Areas (HA)		<b>RECEIVED</b> AUG 18 2023 BY: <i>AR</i>	

Sample Number	HA Number	Sample Location	Material Description
MAL-001A		Attic	Roof Drain cover
B		"	"
C		"	"
MAL-002A		1st Bath	Shetrock
B		2nd Bath	"
C		3rd Bath	"
MAL-003A		1st Fl Bath	Shower floor coating
B		"	"
C		"	"
MAL-004A		1st Fl Bath (Wall)	cer. tile adhesive

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.) NOB per MEDAP		Method of Shipment: <i>FEDEX</i>	
Relinquished by: <i>Deb Kasik</i>		Sample Condition Upon Receipt:	
Relinquished by: <i>Deb Kasik</i>		Received by: <i>AR</i>	
Date/Time: <i>8/10/23 9:17/23 9am</i>		Date/Time: <i>8/18/23 9:15</i>	

Controlled Document - Asbestos Bulk R7 9/14/2021

☐ AGREE TO ELECTRONIC SIGNATURE (E-Signature) (Consent to print this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.

AUG 21 2023

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FeeVEx # 7966 8998 65712

Page 2 of 2 M

## **SECTION 011000 - SUMMARY**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Project information.
2. Work covered by Contract Documents.
3. Type of contract
4. Intent of the Contract Documents
5. Work schedule and phasing
6. Access to site.
7. Coordination with occupants
8. Work restrictions
9. 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.

#### **1.2 DEFINITIONS**

- A. Days:** Consecutive days, as occurring on a calendar, taking into account the day of the week, month, year, and any religious, national or local holidays
- B. Work Day:** Any day from Monday through Friday.

#### **1.3 PROJECT INFORMATION**

- A. Project Identification:** Mallett Hall and Purington Hall Renovation at University of Maine at Farmington, located at:
1. Purington Hall: 172 High St., Farmington, ME 04086.
  2. Mallett Hall: 180 High St., Farmington, ME 04086.
- B. Owner:** University of Maine System.
- C. Architect Identification:** The Contract Documents were prepared for Project by CHA Architecture, 49 Dartmouth Street, Portland, Maine 04101. Telephone 207-775-1059.

#### 1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
1. Renovation of bathrooms to provide ADA compliant, single user bathrooms.
  2. New Laundry room on First Floor at both buildings.
  3. New kitchen at Mallett Hall.
  4. Replacement of select doors and frames.
  5. Addition of a Limited Use / Limited Application (LU/LA) elevator to access all floors of each building.
  6. Provision of exterior ramps at building entrances for ADA access.

#### 1.5 TYPE OF CONTRACT

- A. Project will be constructed under a single prime contract.
- B. Contract Type: AIA Document A201 General Conditions of the Contract for Construction as amended by the University of Maine System.

#### 1.6 INTENT OF THE CONTRACT DOCUMENTS

- A. If, in the interpretation of Contract Documents, requirements within the Drawings and Specifications conflict, or it appears that the Drawings and Specifications are not in agreement, the Contractor shall provide (1) the greater quantity, where there is a discrepancy in quantity, and (2) the superior quality, where there is a discrepancy in quality. All discrepancies shall be brought to the attention of the Architect. The Architect's decision on resolving the discrepancy shall be final.
- B. Existing Conditions: Existing conditions are shown on the drawings to the best knowledge of the Architect. The Architect, however, cannot guarantee the correctness of the existing conditions shown and assumes no responsibility therefore. It shall be the responsibility of the Contractor to verify all existing conditions.
- C. Contractor shall take all necessary field measurements prior to fabrication and installation of work and shall assume complete responsibility for accuracy of same.

#### 1.7 WORK SCHEDULE AND PHASING

- A. The Work shall be substantially complete on or before July 2, 2024. It is extremely important that the Owner resume its full use of the building and site on the completion date(s) specified. Liquidated damages will be assessed by the Owner for each day the work continues past the Substantial Completion date.
- B. Immediately upon receipt of Notice to Proceed from Owner, which is anticipated be on or about October 2023, Contractor shall begin preparing required bonds, insurance

certificates and other required submittals. Work may be performed at the site only after Owner approval of these required submissions.

## 1.8 ACCESS TO SITE

- A. Limits: Confine constructions operations to areas within contract limits indicated. Do not disturb portions of the building and site beyond the areas in which the Work is indicated. All areas of the building and site with the exception of the project area where the Work is being performed are off limits to Contractor and his employees.
  - 1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, students and parents, the public 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.
    - c. Coordinate staging, parking and storage areas with the Owner.
- B. Damages: Promptly repair damages caused to adjacent facilities by work of the Contract to a good-as-new condition acceptable to the Owner.

## 1.9 COORDINATION WITH OCCUPANTS

- A. Owner Occupancy: The buildings will both be vacant during the performance of the Work of this Contract.
- B. Existing Utility Shutdowns: Coordinate all utility shut downs and cross overs with the Owner and Architect. Do not interrupt utilities serving adjacent 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 Architect and Owner not less than two work days in advance of proposed utility interruptions. Include planned shut-downs and interruptions in Construction Schedule.
- C. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
  - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
  - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.

3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

#### 1.10 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: Work shall be generally performed during normal business working hours of 7:00 a.m. to 5:00 p.m., Monday through Friday, except otherwise indicated.
  1. Weekend Hours: As approved by Architect and Owner.
  2. Early Morning Hours: As approved by Architect and Owner.
  3. Hours for Utility Shutdowns: As approved by Architect and Owner.
  4. Provide 24 hour notice to Architect when performing work other than normal working hours.
- C. Delivery Restrictions: Coordinate with the Owner for permissible times and locations/truck access for deliveries on site. Large deliveries shall be made after hours
- D. Noise, Vibration, and Odors: Notify Owner and coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to surrounding spaces.
  1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.
  2. Construction activity noise levels shall not exceed 50 dBA
- E. Smoking is prohibited in and on the grounds of the campus.
- F. Drugs, Alcohol, Substance Abuses, and Firearms: It is strictly prohibited to possess, use, conceal, transport, traffic any drugs, alcohol, controlled substances, or firearms on the premises of the campus. Any violations shall be grounds for dismissal and may be cause for termination of any contracts or portions thereof.
- G. Comply with Owner's standards for construction projects as follows:
  1. Interaction with employees and students is strictly forbidden.
  2. Use of offensive or inappropriate language is strictly forbidden.
  3. The use of radios and CD players is prohibited on the site and in the buildings.
  4. Fraternizing with students or staff at the school is prohibited.

## 1.11 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 49-division format and CSI's "2012 MasterFormat" numbering system.
1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
  2. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- B. 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.
- 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.
  3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

## **SECTION 011100- SPECIAL PROJECT REQUIREMENTS – STORMWATER MANAGEMENT**

### **PART 1 GENERAL**

#### **1.01 LID POLICY**

University of Maine Projects are required to comply with the Maine Department of Environmental Protection policies regarding Stormwater Management. The University has developed a Low Impact Development (LID) Policy which will be followed by the University in the design and implementation of projects.

##### **Section 1: Purpose**

Low Impact Development (LID) is a stormwater management approach that protects public health, safety, and general welfare by minimizing the adverse effects of development and redevelopment on the environment. LID is a broad approach to site planning that preserves natural resources, processes, and habitats. It defines what portions of the site are suitable for development and then utilizes Stormwater Treatment Measures (STMs) to manage runoff from the proposed developed impervious areas. In LID, STMs using natural processes such as vegetated buffers are given preference over constructed treatment STMs. The goals of LID are to minimize the environmental impacts of development, such as flooding, erosion, and water pollution. This LID Policy was developed to comply with the requirements of the 2022 General Permit for the Discharge of Stormwater from Small State and Federally Owned Municipal Separate Storm Sewer Systems (MS4s).

##### **Section 2: Definitions**

**Construction Activity** – Means any activity on a site that results in disturbed area.

**Discharge**- Means any spilling, leaking, pumping, pouring, emptying, dumping, disposing or other addition of pollutants to the Waters of the State, other than groundwater.

**Disturbed Area**- Means all land areas of a Site that are stripped, graded, grubbed, filled, or excavated at any time during the site preparation or removing vegetation for, or construction of, a Project. Cutting of trees, without grubbing, stump removal, disturbance, or exposure of soil is not considered Disturbed Area. Disturbed Area does not include routine maintenance but does include Redevelopment and new Impervious Areas. "Routine maintenance" is maintenance performed to maintain the original line and grade, hydraulic capacity, and original purpose of the facility. Paving impervious gravel surfaces provided that an applicant or permittee can prove the original line and grade and hydraulic capacity shall be maintained and original purpose of the surface remains the same is considered routine maintenance. Replacement of a building

is not considered routine maintenance of the building and is therefore considered Disturbed Area.

**Impervious Area-** Means the total area of a Parcel covered with a low-permeability material that is highly resistant to infiltration by water, such as asphalt, concrete, or rooftop, and areas such as gravel roads and unpaved parking areas that will be compacted through design or use to reduce their permeability. Common Impervious Areas include, but are not limited to, rooftops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, gravel roads, packed earthen materials, and macadam or other surfaces which similarly impede the natural infiltration of stormwater. Pervious pavement, pervious pavers, pervious concrete, and under drained artificial turf fields are all considered impervious.

**Low Impact Development (LID)-** Means a broad approach to site planning that preserves natural resources, processes, and habitat, defines what portions of the Site are suitable for development and then utilizes STMs to manage Runoff from the proposed developed impervious areas. In LID, Stormwater Treatment Measures using natural processes such as vegetated buffers are given preference over constructed treatment Stormwater Treatment Measures. The goals of LID are to minimize the environmental impacts of the development.

**Maine Native Vegetation-** Means vegetation including grass seed mixtures, identified as native to Maine from lists maintained by: US Department of Agriculture Hardiness Zones by the Maine Cooperative Extension, Wild Seed Project, Regional Soil and Water Conservation District, Maine YardScaping Program, or a Maine Licensed Landscape Architect.

**New Development-** means activity undertaken to develop property, including but not limited to: the construction of buildings, parking lots, roads and other new impervious surfaces; landscaping; and other activities that disturb land areas. New Development or Construction does not include Redevelopment or maintenance.

**Project-** Means Construction Activity undertaken for New Development or Redevelopment, both as defined in the General Permit, located on a Site that will Discharge Stormwater to a Small MS4 located partially or entirely within the Urbanized Area.

**Redevelopment-** means an activity, not including maintenance, undertaken to redevelop or otherwise improve property in which the newly developed area is located within the same footprint as the existing developed area.

**Runoff-** Means the part of precipitation from rain or melting ice and snow that flows across a surface as sheet flow, shallow concentrated flow or in Drainageways.

**Site-** Means the portion of a Lot, Parcel, or Common Plan of Development which is proposed for Construction Activity, including open space, Stormwater Treatment Measures, and Disturbed Area, subject to this policy.

**Stream Crossing-** Means the mechanism by which any road, sidewalk, or other structural feature of a Site will cross or pass over or through a Water of the State which has a stream bank full width of 6 feet or less.

**Stream Crossing designed in accordance with Maine Stream Smart Principles-** Means a Stream Crossing designed by a Maine Professional Engineer who has completed the Maine Audubon Society Stream Smart Workshops (Parts I and II), which includes the standards recommended by that program's stream span, elevation, slope and skew and substrate to promote passage of fish and other organisms and to limit road-damaging flows from extreme weather.

**Stormwater Treatment Measure-** Means a Stormwater management system or innovative treatment measure as described in Chapter 500 4.c.(3) Types of treatment measures allowed. These measures include wet ponds, vegetated soil filters, infiltration, buffers, or innovative treatment measures. For purposes of this Ordinance these are cumulatively referred to as Stormwater Treatment Measures, or individually referred to as Stormwater Treatment Wet Pond, Stormwater Treatment Vegetated Soil Filter, Stormwater Treatment Infiltration Measure, Stormwater Treatment Buffer, or Stormwater Treatment Innovative Measure.

### **Section 3: Applicability**

If a proposed development or redevelopment project meets the following threshold, it is subject to the Lid requirements in this Policy:

- ☐ Projects that disturb  $\geq 1.0$  acre
- ☐ Projects that disturb  $< 1.0$  acre that are part of a larger common plan of development or sale that cumulatively exceeds 1.0 acre of disturbance

### **Section 4: Required Low Impact Development Performance Standards**

1. Minimize site clearing
2. Protect natural drainage system
3. Minimize the decrease in time of concentration
4. Minimize impervious area or the effect of impervious area
5. Minimize soil compaction
6. Minimize lawns and maximize landscaping that encourages runoff retention
7. Provide vegetated open-channel conveyance systems
8. Rainwater is stored for later reuse for the building or landscape

### **Section 5: Design Requirements**

For proposed development & redevelopment projects subject to this policy per Section 3, the following must be provided by a State of Maine Licensed

Professional Engineer (PE) to clearly demonstrate that LID strategies were implemented throughout the design process:

- ☐ The 'LID Submittal Checklist' (Table 1) within this policy outlining in detail what LID design elements were utilized in the project and/or why elements could not be incorporated into the project.
- ☐ Design plans including appropriate details showing the LID design elements referenced in Table 1.

## Section 6: Design Review & Conformance

The Licensed Design Professional will analyze the existing site and the proposed design to determine whether the required LID measures are included to the Maximum Extent Practicable (MEP) in the project contract documents. As part of the process the University will review and approve the design for conformance to the Low Impact Development Policy prior to project execution. Table 1 below will be included as part of the contract documents and will be provided as part of all applications to regulatory agencies.

In order to demonstrate that LID measures were utilized to the Maximum Extent Practicable (MEP), the Contract Documents must clearly show how Section 4 requirements have been met:

1. How applicable LID measures were implemented
2. Reasoning why some LID measures could not be implemented into the project due to:
  - a. Technical infeasibility, or
  - b. Site-specific characteristics.

**LID Submittal Checklist (Table 1)**

Lid Performance Standards		Typical design methods to achieve lid performance standard (but not limited to)	<u>Required Application Response</u> How was this lid performance standard implemented or taken into consideration during project design?	<u>University Review and approval of the Design Documents for conformance to the MEP.</u>
1	Minimize Site Clearing	A) Project plans depict limits of disturbance and limits are established on-site prior to disturbance using flagging or fencing. B) Promote compact development. C) Place parking underneath or inside structures.		
2	Protect Natural Drainage System	A) Maintain a minimum 25' buffer on all natural water resources including intermittent channels.		

Lid Performance Standards	Typical design methods to achieve lid performance standard (but not limited to)	<u>Required Application Response</u> How was this lid performance standard implemented or taken into consideration during project design?	<u>University Review and approval of the Design Documents for conformance to the MEP.</u>
	B) Utilize Maine Stream Smart Principles for Proposed stream crossings. C) Utilize natural flow patterns for the post-construction drainage system.		
3	Minimize the decrease in time of concentration A) Break up or disconnect the flow of runoff over impervious surfaces via vegetated buffers. B) Detain flows onsite. C) Promote sheet flow over pavement that is less than 100 feet in length or width. D) Increase flow lengths or the surface roughness of the flow path (i.e. vegetated open channels).		
4	Minimize impervious area or the effect of impervious area A) Go vertical with multi-story buildings and parking garages. B) At least 70% of roadway runoff shall be directed into stormwater treatment measures. C) Utilize pervious ground treatments. D) Minimize the number and size of proposed parking spaces. E) Minimize the length/and widths of proposed roads and driveways.		
5	Minimize soil compaction A) Minimize construction B) Construction equipment movement, laydown areas, and parking shall be restricted to the disturbed area. C) Rototill all areas to be revegetated		
6	Minimize lawns and maximize landscaping that encourages runoff retention A) Propose low-maintenance Maine native plant species B) Minimize lawns and maximize vegetated buffers C) Utilize 4" minimum quality topsoil with high organic content or clean compost material		
7	Provide vegetated open-channel conveyance systems A) Runoff from on-site roofs, sidewalks, and peak-use overflow parking runoff shall be directed into Stormwater treatment Buffers or Stormwater Treatment Infiltration Measures. B) Level spreaders to buffers where possible. C) Underdrained swales.		
8	Rainwater is stored for later reuse for the building or landscape A) Require the implementation of precipitation storage (e.g., cisterns or rain barrels) for later reuse for landscaping.		

END OF SECTION 011100

## **SECTION 011400 - WORK RESTRICTIONS**

### **PART 1 GENERAL**

#### **1.01 PROJECT CONDITIONS**

- A. Tobacco Free Campus Policy: On January 1, 2011 the University System adopted a tobacco free campus policy. As of January 1, 2012 compliance with the tobacco free campus policy became mandatory. This paragraph serves as notification to Contractor of the policy and provides the parameters of compliance enforcement. Contractor shall be responsible for notifying its workers and subcontractors regarding the policy and for enforcement of the policy with same. Noncompliance will be managed as follows:

1. First offense – notify Contractor to remind employee and/or subcontractor of policy.
2. Second offense – contractor/subcontractor employee removed from campus for the remainder of the Work.

Additional information regarding the tobacco free campus policy is located at:  
<http://umaine.edu/tobaccofree/>

- B. Sexual Harassment will not be tolerated on the campuses of the University of Maine System.
- C. Weapons and Ammunition are not permitted on the campuses of the University of Maine System.
- D. Contractor will be required to provide a site-specific Safety Plan for the project.
- F. Contractor parking will be limited to authorized areas defined by the University of Maine System Representative.

### **PART 2 to 3 – Not Used**

END OF SECTION 011400

## **SECTION 012300 - ALTERNATES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for alternates.

#### **1.2 DEFINITIONS**

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
  - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
  - 2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

#### **1.3 PROCEDURES**

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1 (ADD ALTERNATE): Ramps at entrance to buildings.
  - 1. Base Bid: No work in this area.
  - 2. Alternate: Provide the following:
    - a. At Mallett Hall: Provide concrete and brick ADA ramp/sloped walkway to existing front porch.
    - b. At Purington: Provide concrete and brick ADA ramp to existing front porch.
- B. Alternate No. 2 (ADD ALTERNATE): LU/LA (Limited Use / Limited Application Elevator).
  - 1. Base Bid: No work in this area.
  - 2. Alternate: Provide LU/LA, including all related electrical, mechanical and finish work.
- C. Alternate No. 3 (ADD ALTERNATE): Condensing unit and refrigerant piping.
  - 1. Base Bid: Provide ERV(s) with cooling coil ONLY.
  - 2. Alternate: Add condensing unit and refrigerant piping to cooling coil in ERV. Add power and controls for condensing unit.

END OF SECTION 012300

## **SECTION 012500 - SUBSTITUTION PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Section 012300 "Alternates" for products selected under an alternate.
  - 2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

#### **1.2 DEFINITIONS**

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- B. Days: Consecutive days, as occurring on a calendar, taking into account the day of the week, month, year, and any religious, national or local holidays
- C. Work Day: Any day from Monday through Friday.

#### **1.3 ACTION SUBMITTALS**

- A. Substitution Requests: Submit electronic copy of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use form provided in Project Manual.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design

- characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
  - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within three work days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution by addendum.
- a. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated or notification is not made by addendum.

#### 1.4 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.
- B. Products with asbestos: Asbestos containing materials are not to be purchased or installed in this project.

## 1.5 PROCEDURES

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

## 1.6 SUBSTITUTIONS

- A. Substitutions: Article 9 of Section 3-A, Conditions of the Contract, specify time restrictions for submitting requests for Substitutions during the bidding period to requirements specified in this section. Requests received after that time may be considered or rejected at discretion of Architect.
  - 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.
    - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

Attachment: Substitution Request Form

SUBSTITUTION REQUEST FORM

Project: \_\_\_\_\_ Substitution Request Number: \_\_\_\_\_  
To: \_\_\_\_\_ From: \_\_\_\_\_  
Re: \_\_\_\_\_ Date: \_\_\_\_\_

Specification Title: \_\_\_\_\_ Description: \_\_\_\_\_  
Section: \_\_\_\_\_ Page: \_\_\_\_\_ Article/Paragraph: \_\_\_\_\_

Proposed Substitution: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone: \_\_\_\_\_  
Trade Name: \_\_\_\_\_ Model No. \_\_\_\_\_

Attached data includes product description, specifications, drawings, and performance and test data adequate for evaluation of the request: applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitutions will require for its proper installation.

The Undersigned certifies:

1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified product.
2. Will provide the same warranty for the Substitution as for the specified Product.
3. Will provide no additional cost to the Owner.
4. Will coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
5. Waive claims for additional costs or time extension that may subsequently become apparent.
6. Will reimburse Owner and Architect/Engineer for review or redesign services associated with substitution.

Submitted By: \_\_\_\_\_  
Signed By: \_\_\_\_\_  
Firm: \_\_\_\_\_  
Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

A/E's REVIEW AND ACTION

\_\_\_ Submission approved - Make submittals in accordance with Specification Section 013300.  
\_\_\_ Submission approved as noted - Make submittals in accordance with Specification Section 013300.  
\_\_\_ Submission rejected - Use specified materials.  
\_\_\_ Submission request received too late - Use specified materials.

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

Supporting Data Attached: \_\_\_ Drawings \_\_\_ Product Data \_\_\_ Samples \_\_\_ Tests \_\_\_ Reports  
\_\_\_ Other \_\_\_\_\_

## **SECTION 012600 - CONTRACT MODIFICATION PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
  - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions.

#### **1.2 MINOR CHANGES IN THE WORK**

- A. Architect 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, "Architect's Supplemental Instructions"

#### **1.3 PROPOSAL REQUESTS**

- A. Owner-Initiated Proposal Requests: Architect 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 Architect are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within 20 days, when not otherwise specified, 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. Use CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, Proposal Worksheet Detail." (included at the end of this section for reference)
- 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 Architect.
  - 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 bonds, insurance, 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. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
  - 7. Proposal Request Form: Use form acceptable to Architect.
- C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

#### 1.4 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.

#### 1.5 CHANGE ORDER PROCEDURES

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

#### 1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect 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**

#### **1.01 RELATED DOCUMENTS**

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

#### **1.02 SUMMARY**

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. The forms for application for payment, duly notarized, shall be the current authorized edition of the AIA Document G702, Application for Payment, supported by a current authorized edition of AIA G703, Continuation Sheet. Samples of these, and other required AIA documents, are provided in the Contract Documents under Division 00 for informational purposes only.

#### **1.03 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.

#### **1.04 SCHEDULE OF VALUES**

- A. Construction Schedule.
  - 1. Correlate 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. Submittals Schedule.
    - c. Contractor's Construction Schedule.
  - 2. Submit the Schedule of Values to Architect prior to the pre-construction meeting.
- B. Format and Content: Use the specification 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. Name of Architect.
    - c. Contractor's name and address.
    - d. Date of submittal.

2. Submit draft of AIA G702 Application for Payment form and AIA G703 Continuation Sheet (Schedule of Values) form.
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).
  - g. Dollar value.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Specification table of contents. Provide several line items for principal subcontract amounts, where appropriate.
  - a. For each line item, provide a sublist breakdown as follows:
    - 1) Material.
    - 2) Labor.
5. Documentation: Submit proper documentation for the amounts being requisitioned from subcontractors and material suppliers with each Application for Payment. Three (3) copies of an Application for Payment or a Payment Requisition are required for all subcontracted work. Three (3) copies of the invoice is required for each major supplier.
6. Stored Materials: If Contractor is requesting payment for stored materials as part of the Application for Payment, Contractor must complete Column F in the G703 Continuation Sheet (Schedule of Values) to record the stored materials amounts against line items that pertain to those stored materials. Stored materials are materials or equipment purchased or fabricated and stored, but not yet installed or incorporated into the Work.
  - a. Complete and provide three (3) copies of 00 62 79 Stored Materials form with all required documentation. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
  - b. Only major long lead delivery items may be considered for off-site storage (example: long lead custom mechanical unit). Standard order and production materials and products shall be delivered to the site before including in Application for Payment of such items.
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 shall be shown as separate line items in the Schedule of Values.
9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when approved Change Orders or Construction Change Directives result in a change in the Contract Sum.

10. Retainage: The required five percent (5%) retainage held per Application for Payment submission shall be accounted for on the G703 on a per line item basis. Each line item with a value in Column G "Total Completed and Stored To Date" shall have a corresponding five percent retainage value entered in Column I.
  - a. Final Release of Retainage: The final release of retainage shall be entered as a separate line item on the G703 as "Final Release of Retainage" with the full amount of the five percent retainage entered as a negative number in Column I. The final release of retainage request is submitted as a separate application.

#### 1.05 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect 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: G702 Application for Payment shall be submitted to Architect and Owner not less than seven (7) days before monthly progress meeting. The period covered by each Application for Payment is one (1) month, ending on the last day of the month.
- C. Payment Application Forms: The Contractor is required under the Contract Documents to use official original AIA documents. Samples of the required documents are provided in Division 00 of the Specifications.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect 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 of approved Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal:
  1. Submit three (3) signed and notarized originals of:
    - a. AIA G702 Application & Certificate for Payment.
    - b. AIA G703 Continuation Sheet.
    - c. AIA G706 Contractor's Affidavit of Payment of Debts & Claims.
    - d. AIA G706A Contractor's Affidavit of Release of Liens.
    - e. 00 65 19.17 Waiver of Lien.
  2. Transmit each Application for Payment with a transmittal form listing attachments and recording appropriate information about submission.

- F. Waivers of Mechanic's Lien: With each Application for Payment, submit three (3) copies of waivers of mechanic's lien from subcontractors, sub-subcontractors, major suppliers, and every entity who is 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 final waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Submit final Application for Payment with or preceded by final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Forms: Submit 00 65 19.17 Waiver of Lien forms, executed in a manner acceptable to Owner.
- G. Certified Payrolls: Wages paid to all workers performing work on the Project shall be in accordance with the Section 00 73 64 Wage Determination Schedule for the Project. Contractor shall submit one (1) copy of each weekly certified payroll for Contractor and all subcontractors, sub-subcontractors, sub-sub-subcontractors, etc. performing work on the Project during the time covered by the Application for Payment. The certified payroll shall be completed in accordance with Section 3.4.4 of the A201 General Conditions and contain the following information:
1. Contractor name.
  2. Contractor address.
  3. Period number.
  4. Week ending date.
  5. Employee(s)'s name.
  6. Employee(s)'s job title.
  7. Employee hourly wage:
    - a. Straight time rate.
    - b. Overtime rate.
  8. Hours worked per day (broken down by straight time and overtime hours).
  9. Hours worked per week (broken down by straight time and overtime hours).
  10. Total earned for the week:
    - a. Straight time.
    - b. Overtime.
  11. Benefits that form a part of the wage rate.
  12. The signature and name of the authorized payroll person.
- H. Initial Application for Payment: Administrative actions and submittals that must precede submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of Values.
  3. Contractor's Construction Schedule.

4. Submittals Schedule.
  5. List of Contractor's staff assignments.
  6. List of Contractor's principal consultants.
  7. Copies of building permits and other required permits.
  8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  9. Initial progress report.
  10. Report of preconstruction conference.
  11. Insurance verification through submission of insurance certificates, for all Subcontractors.
- I. Progress Applications for Payment: Administrative actions and submittals that must precede or coincide with submittal of progress Applications for Payment include the following:
1. Contractor's Construction Schedule update.
  2. Submittals for Work being requisitioned that are complete and approved.
  3. Submission of list of completed tests, checklists, commissioning, reports, and similar requirements for the work that are submitted and in compliance with the Contract Documents.
  4. Distribution of minutes of previous month's progress meeting.
  5. Current record drawings.
- J. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion, less retainage, for portion of the Work claimed as substantially complete. Application must:
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. Reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: 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 fees and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA G707 Consent of Surety to Final Payment, three (3) originals.
  5. Evidence that claims have been settled.
  6. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
  7. Final, liquidated damages settlement statement, if a liquidated damages claim has been processed.

8. As-built drawings.
9. Operation and maintenance manuals.
10. Final lien waivers.
11. All training and equipment testing is complete.

**PART 2 to 3 – Not Used**

END OF SECTION 01 29 00

## **SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Digital project management procedures.
  - 3. Requests for Information (RFIs).
  - 4. Project meetings.
- 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.

#### **1.2 DEFINITIONS**

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.
- B. Days: Consecutive days, as occurring on a calendar, taking into account the day of the week, month, year, and any religious, national or local holidays
- C. Work Day: Any day from Monday through Friday.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Subcontract List: Within 15 days of starting construction operations, 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. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

#### 1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
  - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical. Coordinate location of pipes, conduits, ducts and similar items in confined areas to assure proper fit and access. Contractor is responsible for handling interferences created by the work of subcontractors (example, sprinkler pipe interfering with installation of duct work; duct work interfering with installation of light fixtures, overhead construction interfering with installation of finish ceilings at proper height).
  - 5. Coordinate the work to provide smoke and fire seals for component interfaces and penetrations of smoke walls and fire rated construction.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's construction schedule.
  - 2. Preparation of the schedule of values.

3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

- D. 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. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

## 1.5 SUPERVISORY AND ADMINISTRATIVE PERSONNEL

- A. Superintendent: Provide a qualified fulltime superintendent who is on site whenever work is being performed.
- B. Other Staff: Provide other qualified supervisory and administrative personnel as required for proper performance of the work.

## 1.6 REQUESTS FOR INTERPRETATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
  3. No work should proceed where there is an unresolved conflict in the contract documents. If there are conflicting details or requirements the Contractor must resolve them with the Design Team before proceeding with the work.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Architect.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.

9. Drawing number and detail references, as appropriate.
  10. 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: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Architect's response for each RFI will be returned as soon as possible.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect 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 Architect.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI description.

6. Date the RFI was submitted.
  7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
  2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

## 1.7 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Web-Based Project Software: Provide, administer, and use web-based Project software site for purposes of hosting and managing Project communication and documentation until Final Completion.
1. Web-based Project software site includes, at a minimum, the following features:
    - a. Compilation of Project data, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
    - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
    - c. Document workflow planning, allowing customization of workflow between project entities.
    - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to the following:
      - 1) RFIs,
      - 2) Action/Information/Closeout submittals,
        - a) Including deficiency/correction punch list
        - b) Operations and Maintenance manuals.
        - c) Electronic record and photographs of physical samples and color selection charts
      - 3) Mock-ups: electronic record and photographs of mock-up, and when specified, field test results of mock-up.
      - 4) Minor Changes in the Work,
      - 5) Construction Change Directives, and
      - 6) Change Orders.
    - e. Track status of each Project communication in real time, and log time and date when responses are provided.

- 1) The tracking systems must be customizable to accommodate durations, turn around times, and dates specified in the bidding documents
- f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
  - g. Processing and tracking of payment applications.
  - h. Processing and tracking of contract modifications.
  - i. Creating and distributing meeting minutes.
  - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
  - k. Management of construction progress photographs.
  - l. Mobile device compatibility, including smartphones and tablets.
  - m. Additional features supported:
    - 1) Location to store and upload Field reports and meeting minutes
      - a) Function to edit, provide comments or remarks, or upload revisions of documents.
2. Provide up to seven web-based Project software user licenses for use of Owner, Architect, and Architect's consultants. Provide eight hours of web-based software training for Project software users.
3. Users of the service require an e-mail address, internet access, and PDF review software with the ability to mark-up/redline, apply electronic stamps, and flatten/secure PDFs.
  - a. PDF functionality requirements may be waived if the Project Management software has those features.
4. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
5. Paper document or electronically mailed (e-mail) transmittals will not be reviewed when Project Management Software is part of the project delivery.
6. Provide one of the following web-based Project software packages under their current published licensing agreements:
  - a. Autodesk; Buzzsaw or Constructware.
  - b. Corecon Technologies, Inc.
  - c. Meridian Systems; Prolog.
  - d. Newforma, Inc.
  - e. Procore Technologies, Inc.
  - f. Viewpoint, Inc.; Viewpoint for Project Collaboration.
  - g. Submittal Exchange.
  - h. EADOC LLC
  - i. Onware Inc.

## 1.8 PROJECT MEETINGS

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

- w. Parking availability.
  - x. Office, work, and storage areas.
  - y. Equipment deliveries and priorities.
  - z. First aid.
  - aa. Security.
  - bb. Progress cleaning.
4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Review of mockups.
    - i. Possible conflicts.
    - j. Compatibility requirements.
    - k. Time schedules.
    - l. Weather limitations.
    - m. Manufacturer's written instructions.
    - n. Warranty requirements.
    - o. Compatibility of materials.
    - p. Acceptability of substrates.
    - q. Temporary facilities and controls.
    - r. Space and access limitations.
    - s. Regulations of authorities having jurisdiction.
    - t. Testing and inspecting requirements.
    - u. Installation procedures.
    - v. Coordination with other work.
    - w. Required performance results.
    - x. Protection of adjacent work.
    - y. Protection of construction and personnel.
  - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
  1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of record documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Submittal of written warranties.
    - d. Requirements for preparing operations and maintenance data.
    - e. Requirements for delivery of material samples, attic stock, and spare parts.
    - f. Requirements for demonstration and training.
    - g. Preparation of Contractor's punch list.
    - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - i. Submittal procedures.
    - j. Coordination of separate contracts.
    - k. Owner's partial occupancy requirements.
    - l. Responsibility for removing temporary facilities and controls.
  4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at agreed upon intervals, anticipated to be 2 times per month.
  1. Coordinate dates of meetings with preparation of payment requests.
  2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future work shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule.

Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

- 1) Review schedule for next period.
- b. Application for Payment: Contractor shall bring copy of Application for Payment to meeting. Review Application for Payment and required attachments, including record drawing and documents status, waivers of mechanic's liens, list of completed tests, checklists, commissioning, reports, and similar requirements for the work are submitted and in compliance with the Contract Documents.
- c. Review present and future needs of each entity present, including the following:
  - 1) Interface requirements.
  - 2) Sequence of operations.
  - 3) Status of submittals.
  - 4) Deliveries.
  - 5) Off-site fabrication.
  - 6) Access.
  - 7) Site utilization.
  - 8) Temporary facilities and controls.
  - 9) Progress cleaning.
  - 10) Quality and work standards.
  - 11) Status of correction of deficient items.
  - 12) Field observations.
  - 13) Status of RFIs.
  - 14) Status of proposal requests.
  - 15) Pending changes.
  - 16) Status of Change Orders.
  - 17) Pending claims and disputes.
  - 18) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
  - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

## **SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Startup construction schedule.
  - 2. Contractor's construction schedule.
  - 3. Construction schedule updating reports.
  - 4. Daily construction reports.
  - 5. Material location reports.
  - 6. Site condition reports.
  - 7. Unusual event reports.

#### **1.2 DEFINITIONS**

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- C. Event: The starting or ending point of an activity.
- D. Float: The measure of leeway in starting and completing an activity.
- E. Days: Consecutive days, as occurring on a calendar, taking into account the day of the week, month, year, and any religious, national or local holidays
- F. Work Day: Any day from Monday through Friday.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Format for Submittals: Submit required submittals in the following format:

1. PDF electronic file.
- B. Startup construction schedule.
- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- D. Construction Schedule Updating Reports: Submit with Applications for Payment.
- E. Daily Construction Reports: Submit at weekly intervals.
- F. Material Location Reports: Submit at monthly intervals.
- G. Site Condition Reports: Submit at time of discovery of differing conditions.
- H. Special Reports: Submit at time of unusual event.
- I. Qualification Data: For scheduling consultant.

#### 1.4 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
  1. Discuss constraints, including phasing, work stages, area separations and milestones.
  2. Review delivery dates for Owner-furnished products.
  3. Review submittal requirements and procedures.
  4. Review time required for review of submittals and resubmittals.
  5. Review requirements for tests and inspections by independent testing and inspecting agencies.
  6. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
  7. Review and finalize list of construction activities to be included in schedule.
  8. Review procedures for updating schedule.

#### 1.5 COORDINATION

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

3. Allow for time in the construction schedule for materials to dry before they are enclosed to prevent the growth of mold and bacteria

## 1.6 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of final completion.
  1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
  1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
  2. Procurement Activities: Include procurement process activities for the 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 15 days for startup and testing.
  5. Commissioning Time: Include no fewer than 15 days for commissioning.
  6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
  7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
  1. Phasing: Arrange list of activities on schedule by phase.
  2. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  3. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use of premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.

4. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
  - a. Subcontract awards.
  - b. Submittals.
  - c. Purchases.
  - d. Mockups.
  - e. Fabrication.
  - f. Sample testing.
  - g. Deliveries.
  - h. Installation.
  - i. Tests and inspections.
  - j. Adjusting.
  - k. Curing.
  - l. Startup and placement into final use and operation.
  - m. Commissioning.
5. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
  - a. Structural completion.
  - b. Temporary enclosure and space conditioning.
  - c. Permanent space enclosure.
  - d. Completion of mechanical installation.
  - e. Completion of electrical installation.
  - f. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
  1. Temporary enclosure and space conditioning.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
  1. Unresolved issues.
  2. Unanswered Requests for Information.
  3. Rejected or unreturned submittals.
  4. Notations on returned submittals.
  5. Pending modifications affecting the Work and Contract Time.
- F. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  3. As the Work progresses, indicate final completion percentage for each activity.
- G. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
  2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

## 1.7 STARTUP CONSTRUCTION SCHEDULE

- A. Gantt-Chart Schedule: Submit startup, horizontal, Gantt-chart-type construction schedule within seven days of date established for commencement of the Work.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

## 1.8 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

## 1.9 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.
4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Testing and inspection.
8. Accidents.
9. Meetings and significant decisions.
10. Unusual events (see special reports).
11. Stoppages, delays, shortages, and losses.
12. Meter readings and similar recordings.
13. Emergency procedures.
14. Orders and requests of authorities having jurisdiction.
15. Change Orders received and implemented.
16. Construction Change Directives received and implemented.
17. Services connected and disconnected.
18. Equipment or system tests and startups.
19. Partial completions and occupancies.
20. Substantial Completions authorized.

- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

#### 1.10 SPECIAL REPORTS

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

1. Submit unusual event reports directly to Owner within one work day of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

## **SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for the following:
  - 1. Preconstruction photographs.
  - 2. Periodic construction photographs.
  - 3. Final completion construction photographs.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting photographic documentation.
  - 2. Section 017700 "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.

#### **1.2 INFORMATIONAL SUBMITTALS**

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files monthly to correspond with timing of monthly payment application submission.
  - 1. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
  - 2. Identification: Provide the following information with each image description in file metadata tag:
    - a. Name of Project.
    - b. Name and contact information for photographer.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Date photograph was taken.
    - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
    - g. Unique sequential identifier keyed to accompanying key plan.

## PART 2 - PRODUCTS

### 2.1 PHOTOGRAPHIC MEDIA

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

## PART 3 - EXECUTION

### 3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
  - 1. Date and Time: Include date and time in file name for each image.
- C. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.
  - 1. Take photographs of existing building within the construction limits to accurately record physical conditions at start of construction.
- D. Periodic Construction Photographs: Take 5-10 photographs per month, recording the progress of the work. Take additional photographs as required to document the status of construction during each month.
- E. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as project record documents. Architect will inform photographer of desired vantage points.
  - 1. Do not include date stamp.

END OF SECTION 013233

## **SECTION 013300 - SUBMITTAL PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 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 013233 "Photographic Documentation" for submitting construction photos.
  - 4. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 5. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

#### **1.2 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.
- D. Work Day: Any day from Monday through Friday.

#### **1.3 ACTION SUBMITTALS**

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  2. Allow sufficient processing time; as a minimum, as indicated in this Section.
  3. Submittals shall be scheduled in an orderly fashion that spreads the submissions out over a period of time to permit Architect adequate opportunity to schedule personnel for timely reviews. Where submittals are not required to be submitted concurrently, or do not require coordination with other submittals, Contractor shall review, stamp, and submit as submittals are received. Contractor shall not receive submittals, hold them, and then release them to the Architect all at once.
  4. A single submittal per specification section is preferred however, if multiple submittals are required for any given section, these must be identified separately on the schedule. When multiple submittals are needed for a section, the schedule must clearly identify which parts of the section will be included with each submittal.
  5. 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.
  6. 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.
  7. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal category: Action; informational.
    - d. Name of subcontractor.
    - e. Description of the Work covered.
    - f. Scheduled date for Architect's final release or approval.
    - g. Scheduled date of fabrication.
    - h. Scheduled dates for purchasing.
    - i. Scheduled dates for installation.
    - j. Activity or event number.
- B. Architect will review Submittal Schedule for concentrations, overloading and similar conflicts which will impact the Architect's ability to meet the schedule and propose revisions to the duration of processing time to the Contractor.
- C. Arrange to have all submittals processed to the Architect within 90 days. Submittals received after this time frame and not identified and agreed to by the Architect on the submittal schedule will not be subject to the 20 day submittal review period.
- D. No submittals shall be reviewed until the entire submittal schedule has been submitted to the Architect.

- E. No payment will be made to Contractor until complete Schedule of Submittals has been received and accepted by Architect.
- F. The Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals if the Contractor fails to submit a Submittal Schedule.

#### 1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

##### A. Architect's Digital Data Files:

1. Any request for digital data files shall be solely and exclusively for use related to this Project.
2. Building Information Modeling (BIM): At the Contractor's written request, electronic data files of the BIM Model will be available from the Architect as a convenience to the Contractor for use in preparing shop drawings and coordination drawings for this Project in accordance with the attached "Agreement for Release of Electronic BIM Files" and following:
  - a. To the extent the Architect chooses to utilize BIM software, it shall be for the Architects use in developing the Instruments of Service.
  - b. BIM files were created by the Architect for the primary purpose of creating 2D contract documents. No implication is intended for any purpose beyond the production of 2D documents.
  - c. BIM Digital Data Files will be available to the Contractor on written request to the Architect in accordance with this Section.
3. CAD Background Drawings: Electronic copies of CAD Background Drawings of the Contract Documents in editable file format will be available from the Architect as a convenience to the Contractor for use in preparing shop drawings for this Project. Refer to "Agreement for Release of Electronic CAD Files" attached to the end of this Section for procedures for ordering and transfer of files and for Architect's limitations of liability for transfer.
  - a. CAD Background Drawings files requested will be delivered in editable file format indicated, and will not be further altered by the Architect prior to delivering them to any said party.
4. Electronic Data Order Procedure: Submit completed "Agreement for Release of Electronic BIM Files" or "Agreement for Release of Electronic CAD Files" attached to this Section to the Architect's representative in .pdf format.
5. Each contractor requesting electronic data file shall sign and return the "Agreement for Release of Electronic BIM Files" or "Agreement for Release of Electronic CAD Files" prior to delivery of said files. No contractor shall transfer these Electronic Files received from the Architect, or any portion thereof to any third party ("Transferee") without written permission of the Architect.
6. The Architect will transfer files to the requesting entity via the Project Information Management (PIM) software.

7. All files are a schematic representation of elements within the project. All Contractors are responsible for field verification and coordination with other trades.
  8. Use of these files does not relieve the Contractor from producing Coordination Drawings and Shop Drawings required by the Contract.
- 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. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Submit product data, shop drawings and samples relating to a complete assembly at one time. Partial submittals will be returned without action.
  5. Interrelated color selections will not be made until all pertinent samples are received by the Architect.
  6. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
  7. Every Product must be submitted within the Section Name and heading to match the Section in which it is written. No mixing of Sections or submitting under different Section Titles
- C. Processing Time: Allow sufficient time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow a minimum of 20 work days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Resubmittal Review: Allow a minimum of 20 work days for review of each resubmittal.
  3. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow a minimum of 5 additional days for initial review of each submittal. Any sequential reviews shall be identified on the Submittal Schedule by the Architect and agreed upon by the Project team.

4. Submittals with color selection: The Contractor shall deliver to Architect a list of submittals for the interior color package and a list for the exterior color package. The Contractor shall deliver all items for exterior color selection at one time. The Architect needs to coordinate the colors of all exterior items and the Contractor shall allow 4 weeks for return of exterior color selections. The Contractor shall deliver all items for interior color selection at the same time. The Architect needs to coordinate the colors of all interior items and the Contractor shall allow 6 weeks for return of interior color selections.
- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
  2. Place fully executed Submittal Cover Sheet as first page of every paper submittal. Complete all required information before submitting to Architect. Submittals received without Submittal Cover Sheet or with incomplete information on cover sheet will be returned for resubmission
  3. Include Contractor's stamp indicating information complies with Contract Document requirements.
  4. Submittals indicating less than complete review by Contractor will be returned for Contractor's compliance without Architect's review.
  5. Include the following information for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name of Architect
    - d. Name of Contractor.
    - e. Name of subcontractor.
    - f. Name of supplier.
    - g. Name of manufacturer.
    - h. Submittal number or other unique identifier, including revision identifier.
      - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
    - i. Number and title of appropriate Specification Section.
    - j. Drawing number and detail references, as appropriate.
    - k. Location(s) where product is to be installed, as appropriate.
    - l. Other necessary identification.
  6. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
  7. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form acceptable to Architect. Architect will return without review submittals received from sources other than Contractor.

- a. Transmit all submittals to Architect unless otherwise indicated.
  - b. When submittal requires review of data by Structural Engineer or Mechanical or Electrical Engineers, submit a copy directly to such engineer with a copy to the Architect.
- E. 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. Place fully executed Submittal Cover Sheet as first page of every electronic submittal. Complete all required information before submitting to Architect. Submittals received without Submittal Cover Sheet or with incomplete information on cover sheet will be returned for resubmission
  - 3. 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).
  - 4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software or electronic form acceptable to Owner, containing the following information:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.
    - d. Name of Contractor.
    - e. Name of firm or entity that prepared submittal.
    - f. Names of subcontractor, manufacturer, and supplier.
    - g. Category and type of submittal.
    - h. Submittal purpose and description.
    - i. Specification Section number and title.
    - j. 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. Submittal and transmittal distribution record.
    - p. Other necessary identification.
    - q. Remarks.
- F. Options: Identify options requiring selection by Architect.

- G. 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 Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- H. Resubmittals: Make resubmittals in same form and manner as initial submittal.
1. Note date and content of previous submittal.
  2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
  4. Architect's Re-review of Submittals: When resubmittals are required due to Contractor's failure to properly coordinate submittals, including coordination with other Prime Contractors, Contractor shall reimburse the Owner for fees paid to the Architect for re-review of submittals through a credit change order, in accordance with the Architect's current fee schedule.
- I. 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.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.
1. The Contractor shall perform no portion of its work requiring submittal and review of shop drawings, product data, samples or similar submittals until the respective submittal has been approved by the Architect. Such work shall be in accordance with approved submittals.
  2. The Contractor shall supply shop drawings to other Contractors engaged by the Owner to perform work in connection with the project to ensure proper coordination of its work with theirs.
  3. Do not proceed with installation until an applicable copy of the submittal is in the installer's possession.
  4. Do not permit use of unmarked copies of submittals in connection with construction.
- K. Project Information Management System: The submittal process will be implemented through the use of a digital processing and tracking software. Use the Project Information Management (PIM) software to transmit all electronic submittals. Contractors must participate in and become capable in using this system.

## 1.5 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. Post electronic submittals as PDF electronic files directly to Project Information Management (PIM) web based software specifically established for Project.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  2. Action Submittals: Submit electronic file except where paper copies of submittals are specifically required.
  3. Informational Submittals: Submit electronic file except where paper copies of submittals are specifically required.
  4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
  3. Mark each copy of each submittal to show which products and options are applicable. Strike extraneous information prior to submittal.
  4. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  5. 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.
  6. Submit Product Data before or concurrent with Samples.
  7. Submit Product Data in the following format:

- a. PDF electronic file.
  - b. The only exception to this is the color charts which will be sent as hard copies in the mail. No photo copies or PDF copies of color charts will be acceptable.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Architect's digital data drawing files is otherwise permitted. Standard information prepared without specific reference to the Project is not considered a Shop Drawing. Verify field measurements prior to preparation of shop drawings
  - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
  - 3. Submit Shop Drawings in the following format:
    - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
  - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  - 2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
  - 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
  - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
  - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
  - a. Number of Samples: Submit three full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  2. Manufacturer and product name, and model number if applicable.
  3. Number and name of room or space.
  4. Location within room or space.
  5. Submit product schedule in the following format:

a. PDF electronic file.

- F. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- J. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

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

## 1.6 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## PART 2 - EXECUTION

### 2.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
  1. The Contractor shall review submittals for completeness and compliance with the Contract Documents. If submittal contains substitutions, Contractor shall process substitutions in accordance with Section 012500 "Substitution Procedures," and not part of specified Shop Drawings or Product Data submittals. Contractor is responsible for keeping Subcontractors on time with the submittal schedule. Submittals that are rejected three times due to incompleteness or failure to incorporate prior submittal comments from the Design Team will be reviewed thereafter at the expense of the Contractor. Compensation will be through credits back to the Owner in the amount of the Architect's services. The Architect will track hours separately related to this compensable submittal review and credits will be managed through Pay Requisitions.
    - a. Owner will compensate Architect for such additional services.
    - b. Owner will deduct the amount of such compensation from Payment Requisitions.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, review 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.
  1. Stamp or statement shall include the following: "The Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto or will do so, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents."
  2. Submittals shall not be passed through to the design team without confirming all required parts of the submittal are included. The design team is entitled to compensation per the procedures outlined below for incomplete submittals.
- D. Table of Contents: Each submittal must include a table of contents that identifies all the items being submitted, the specific spec section reference of each, and what page each item can be found on. An annotated reproduction of the spec section can suffice

for this requirement if preferred. The Table of Contents or annotated spec should follow the submitting contractor's transmittal page.

## 2.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, provide a cover sheet with marks to indicate corrections or modifications required, and return it. If Contractor is using a project management software to process submittals, the submittal response categories on the submittals cover sheet must align with the action categories indicated below, to match Architect's cover sheet. Architect will provide a cover sheet with each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
1. Reviewed: Final Unrestricted Release. Work may proceed, provided it complies with the Contract Documents.
  2. Furnish as Corrected: Final But Conditional Release. Work may proceed, provided it complies with the notations and corrections on submittals and with Contract Documents. Architect's comments shall be considered a part of the original submittal. Should Contractor disagree with any such comments, so notify the Architect within ten (10) work days after receipt of such transmittal and before commencing work on the items in question. Failing this, Contractor shall be deemed to have agreed to such comments by the Architect and to have accepted full responsibility for implementing them at no additional cost to the Owner.
  3. Revise and Resubmit: Returned for Resubmittal. Do not proceed with the work at the site or allow submittal at site. Fabrication in shop or factory may proceed on items not affected by the Architect's comments only. Revise submittal in accordance with notations thereon, and resubmit without delay to obtain a different action marking. Revise and Resubmit
  4. Submit Specified Item: Resubmit using a specified item. Where submittal is rejected and returned for resubmittal of a specified product. Consult product section for list of acceptable manufacturers.
  5. Rejected: Where submittal is returned for other reasons, with Architect's explanation included.
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

ATTACHMENTS:

- "Agreement for Release of Electronic CAD Files"
- "Agreement for Release of Electronic BIM Files"

**Date**

**[Name and Address of Party  
Receiving files]**

**Re: Agreement for Release of Electronic CAD Files  
[Project #]**

Dear Sir or Madam:

CHA ("CHA" as used herein shall be deemed to include both CHA Consulting, Inc. and its affiliate Clough, Harbour & Associates, LLP) will deliver to [Name of party receiving files] (hereinafter referred to as "Recipient") designs on electronic media subject to the terms and conditions set forth herein.

These files were generated using AutoCAD release **[year of ACAD release]**, operating on a Windows computer. Recipient may, at its own risk, attempt to use the files on other systems and/or with other software packages by converting the .dwg files from AutoCAD to a neutral file that can be translated to be run by your system hardware and software. CHA, however, does not certify that the translation software will deliver a complete and compatible file for use on your system. Any verification of such adaptation by Recipient will entitle CHA to additional compensation at CHA's current hourly rates for the personnel involved.

These AutoCAD files, and any information contained therein, are provided solely for the convenience of Recipient. Recipient acknowledges that the information contained in the AutoCAD files may differ from the Construction Documents in material respects. Delivery of the AutoCAD files to Recipient does not in any manner relieve Recipient from the requirements of the Contract Documents. Specifications developed by CHA for the project require that the work and coordinated shop drawings reflect actual field verified conditions for all equipment, utilities, ductwork, site elements and other items. Further, Recipient acknowledges that data stored on electronic media can deteriorate undetected or can be modified without CHA's knowledge. Accordingly, Recipient agrees that CHA will not be held liable for the completeness or correctness of the AutoCAD files, *and that Recipient may only justifiably rely upon the sealed drawings previously provided to CHA's client for any purpose in connection with the project.* As an example, and without limiting the generality of the foregoing, the AutoCAD files are not intended to be used for the detection of conflicts, preparation of shop drawings, development of quantity take offs, development of construction phasing schedules and models, construction cost estimates, construction of the project or any other uses other than as specifically described above.

Any use of the AutoCAD files for any purpose inconsistent with the foregoing, or any use of altered files or reuse of files for any purpose other than that for which they were prepared, without written authorization by CHA for the specific purpose intended, will be at the sole risk and full legal responsibility of Recipient, and CHA assumes no liability or legal responsibility for such uses. Recipient also agrees not to forward the electronic files to any other party without the express written authorization of CHA. Furthermore, Recipient will, to the fullest extent permitted by law, indemnify and hold CHA harmless from any and all claims, suits, liability, demands, judgment, or costs arising out of or resulting from such use or reuse.

If you agree to the terms and conditions set forth above, please indicate such agreement by signing below and returning this letter to my attention. Upon receipt of a signed letter, we will provide you with the requested electronic files.

Very truly yours,

**[Your Name]**  
**CHA**

I have the authority to execute this agreement on behalf of the

**[Name of party receiving files]**

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

[Date]

[Name and Address of Party  
Receiving Files]

Re: Agreement for Release of Electronic BIM Files  
[Project #]

Dear Sir or Madam:

CHA ("CHA" shall include both CHA Consulting, Inc. and its affiliate, Clough Harbour & Associates LLP) will deliver Revit files on electronic media as requested by Recipient.

These BIM files were generated using [Revit Architectural] [Revit Structure] [Revit MEP] release [2018] [2019] [2020] [2021] [2022], operating on a Windows computer. Recipient may, at its own risk, attempt to use the files on other systems and with other software packages by converting the RVT files from Revit to a neutral file that can be translated to be run by your system hardware and software. CHA, however, does not certify that the translation software will deliver a complete and compatible file for use on your system. Any verification of such adaptation by Recipient will entitle CHA to additional compensation at CHA's current hourly rates for the personnel involved.

The Revit files, and any information contained therein, are provided solely for the convenience of Recipient. Recipient acknowledges that the Revit files were developed to a level of detail intended only for the purpose of communicating design intent and as a tool for CHA's use in developing two-dimensional (2D) Construction Documents, and that the information contained in the Revit files may differ from the Construction Documents in material respects. Delivery of the Revit files to Recipient does not in any manner relieve Recipient from the requirements of the Contract Documents. Specifications developed by CHA for the project require that the work and coordinated shop drawings reflect actual field verified conditions for all equipment, utilities, ductwork, site elements and other items. Further, Recipient acknowledges that data stored on electronic media can deteriorate undetected or can be modified without CHA's knowledge. Accordingly, Recipient agrees that CHA will not be held liable for the completeness or correctness of the Revit files, *and that Recipient may only justifiably rely upon the sealed drawings previously provided to CHA's client for any purpose in connection with the project.* As an example, and without limiting the generality of the foregoing, the Revit file is not intended to be used for the detection of conflicts, preparation of shop drawings, development of quantity take offs, development of construction phasing schedules and models, construction cost estimates, construction of the project or any other uses other than as specifically described above.

Any use of the Revit files for any purpose inconsistent with the foregoing, or any use of altered files or reuse of files for any purpose other than that for which they were prepared, without written authorization by CHA for the specific purpose intended, will be at the sole risk and full legal responsibility of Recipient, and CHA assumes no liability or legal responsibility for such uses. Furthermore, Recipient will, to the fullest extent permitted by law, indemnify and hold CHA harmless from any and all claims, suits, liability, demands, judgment, or costs arising out of or resulting from such use or reuse.

If you agree to the terms and conditions set forth above, please indicate such agreement by signing below and returning this letter to my attention. Upon receipt of a signed letter, we will provide you with the requested electronic files.

Very truly yours,

[Your Name]  
CHA

I have the authority to execute this agreement on behalf of the

[Recipient]

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Title

## **SECTION 014000 - QUALITY REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
  - 4. Specific test and inspection requirements are not specified in this Section.

#### **1.2 DEFINITIONS**

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- J. Mockups: Physical assemblies of portions of the Work constructed to establish the standard by which the Work will be judged. Mockups are not Samples.
  - 1. Mockups are used for one or more of the following:
    - a. Verify selections made under Sample submittals.
    - b. Demonstrate aesthetic effects.
    - c. Demonstrate the qualities of products and workmanship.
    - d. Demonstrate successful installation of interfaces between components and systems.
    - e. Perform preconstruction testing to determine system performance.
  - 2. Product Mockups: Mockups that may include multiple products, materials, or systems specified in a single Section.
  - 3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction

### 1.3 DELEGATED DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria

indicated. Include list of codes, loads, and other factors used in performing these services.

#### 1.4 CONFLICTING REQUIREMENTS

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

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities
- B. Qualification Data For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: Submit copy of written statement of responsibility acknowledging awareness of the special requirements contained in the Statement of Special Inspection, to authorities having jurisdiction before starting work on the following systems:
  - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspection.
  - 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspection.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Entity responsible for performing tests and inspections.
  - 3. Description of test and inspection.
  - 4. Identification of applicable standards.
  - 5. Identification of test and inspection methods.
  - 6. Number of tests and inspections required.
  - 7. Time schedule or time span for tests and inspections.
  - 8. Requirements for obtaining samples.

9. Unique characteristics of each quality-control service.

F. Reports: Prepare and submit certified written reports and documents as specified

G. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: The Contractor shall establish a Quality Control Plan to perform inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. This Quality Control Plan shall ensure conformance to applicable specifications and plans with respect to materials, workmanship, construction, finish, and functional performance. The Quality Control Plan shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of quality control.

1. Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference.
2. Submit in format acceptable to Architect and Owner.
3. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.

B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
3. Owner-performed tests and inspections indicated in the Contract Documents.

- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

## 1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.
  - 6. Description of the Work and test and inspection method.
  - 7. Identification of product and Specification Section.
  - 8. Complete test or inspection data.
  - 9. Test and inspection results and an interpretation of test results.
  - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, and telephone number of technical representative making report.
  - 2. Statement on condition of substrates and their acceptability for installation of product.
  - 3. Statement that products at Project site comply with requirements.
  - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  - 6. Statement whether conditions, products, and installation will affect warranty.
  - 7. Other required items indicated in individual Specification Sections.

- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.
  3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  4. Statement whether conditions, products, and installation will affect warranty.
  5. Other required items indicated in individual Specification Sections.

## 1.8 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, an agency accredited by the International Accreditation Service, Inc. or an equivalent accreditation agency accrediting in accordance with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
    - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
    - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - f. When testing is complete, remove test specimens, assemblies; do not reuse products on Project.
- K. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with a copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- L. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups of size indicated.
  2. Build mockups in location indicated or, if not indicated, as directed by Architect.
  3. Notify Architect minimum seven days in advance of dates and times when mockups will be constructed.
  4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
  5. Demonstrate the proposed range of aesthetic effects and workmanship.

6. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
  - a. Allow minimum seven days for initial review and each re-review of each mockup.
7. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
8. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
10. Demolish and remove mockups when directed or incorporate approved in-place mock-ups in the finished work, as specifically instructed in each specification section where a mock-up is required.

## 1.9 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
  1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  3. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

- C. **Manufacturer's Field Services:** Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300 "Submittal Procedures."
- D. **Manufacturer's Technical Services:** Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. **Retesting/Reinspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. **Testing Agency Responsibilities:** Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  - 6. Do not perform any duties of Contractor.
- G. **Associated Services:** Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
  - 1. Access to the Work.
  - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
  - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  - 4. Facilities for storage and field curing of test samples.
  - 5. Delivery of samples to testing agencies.
  - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  - 7. Security and protection for samples and for testing and inspecting equipment at Project site.

- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses, but no less than monthly.
  - 1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.10 SPECIAL INSPECTIONS – Not applicable

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 7300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.

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

END OF SECTION 014000

## SECTION 014200 - REFERENCES

### PART 1 - GENERAL

#### 1.1 DEFINITIONS

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

#### 1.2 INDUSTRY STANDARDS

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

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

### 1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Abbreviations and acronyms not included in this list are to mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States." The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. AABC - Associated Air Balance Council; [www.aabc.com](http://www.aabc.com).
  2. AAMA - American Architectural Manufacturers Association; (see FGIA).
  3. AAPFCO - Association of American Plant Food Control Officials; [www.aapfco.org](http://www.aapfco.org).
  4. AASHTO - American Association of State Highway and Transportation Officials; [www.transportation.org](http://www.transportation.org).
  5. AATCC - American Association of Textile Chemists and Colorists; [www.aatcc.org](http://www.aatcc.org).
  6. ABMA - American Bearing Manufacturers Association; [www.americanbearings.org](http://www.americanbearings.org).
  7. ABMA - American Boiler Manufacturers Association; [www.abma.com](http://www.abma.com).
  8. ACI - American Concrete Institute; [www.concrete.org](http://www.concrete.org).
  9. ACP - American Clean Power; (Formerly: American Wind Energy Association); [www.cleanpower.org](http://www.cleanpower.org).
  10. ACPA - American Concrete Pipe Association; [www.concretepipe.org](http://www.concretepipe.org).
  11. AEIC - Association of Edison Illuminating Companies, Inc. (The); [www.aeic.org](http://www.aeic.org).
  12. AF&PA - American Forest & Paper Association; [www.afandpa.org](http://www.afandpa.org).
  13. AGA - American Gas Association; [www.aga.org](http://www.aga.org).
  14. AHAM - Association of Home Appliance Manufacturers; [www.aham.org](http://www.aham.org).
  15. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); [www.ahrinet.org](http://www.ahrinet.org).
  16. AI - Asphalt Institute; [www.asphaltinstitute.org](http://www.asphaltinstitute.org).
  17. AIA - American Institute of Architects (The); [www.aia.org](http://www.aia.org).
  18. AISC - American Institute of Steel Construction; [www.aisc.org](http://www.aisc.org).
  19. AISI - American Iron and Steel Institute; [www.steel.org](http://www.steel.org).
  20. AITC - American Institute of Timber Construction; (see PLIB).
  21. AMCA - Air Movement and Control Association International, Inc.; [www.amca.org](http://www.amca.org).
  22. AMPP - Association for Materials Protection and Performance; [www.ampp.org](http://www.ampp.org).

23. ANSI - American National Standards Institute; [www.ansi.org](http://www.ansi.org).
24. AOSA/SCST - Association of Official Seed Analysts (The)/Society of Commercial Seed Technologists (The); [www.analyzeseeds.com](http://www.analyzeseeds.com).
25. APA - APA - The Engineered Wood Association; [www.apawood.org](http://www.apawood.org).
26. APA - Architectural Precast Association; [www.archprecast.org](http://www.archprecast.org).
27. API - American Petroleum Institute; [www.api.org](http://www.api.org).
28. ARMA - Asphalt Roofing Manufacturers Association; [www.asphaltroofing.org](http://www.asphaltroofing.org).
29. ASA - Acoustical Society of America; [www.acousticalsociety.org](http://www.acousticalsociety.org).
30. ASCE - American Society of Civil Engineers; [www.asce.org](http://www.asce.org).
31. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (see ASCE).
32. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; [www.ashrae.org](http://www.ashrae.org).
33. ASME - ASME International; [**American Society of Mechanical Engineers (The)**]; [www.asme.org](http://www.asme.org).
34. ASSE - ASSE International; (American Society of Sanitary Engineering); [www.asse-plumbing.org](http://www.asse-plumbing.org).
35. ASSP - American Society of Safety Professionals; [www.assp.org](http://www.assp.org).
36. ASTM - ASTM International; [www.astm.org](http://www.astm.org).
37. ATIS - Alliance for Telecommunications Industry Solutions; [www.atis.org](http://www.atis.org).
38. AVIXA - Audiovisual and Integrated Experience Association; [www.avixa.org](http://www.avixa.org).
39. AWI - Architectural Woodwork Institute; [www.awinet.org](http://www.awinet.org).
40. AWMAC - Architectural Woodwork Manufacturers Association of Canada; [www.awmac.com](http://www.awmac.com).
41. AWWA - American Wood Protection Association; [www.awpa.com](http://www.awpa.com).
42. AWS - American Welding Society; [www.aws.org](http://www.aws.org).
43. AWWA - American Water Works Association; [www.awwa.org](http://www.awwa.org).
44. BHMA - Builders Hardware Manufacturers Association; [www.buildershardware.com](http://www.buildershardware.com).
45. BIA - Brick Industry Association (The); [www.gobrick.com](http://www.gobrick.com).
46. BICSI - BICSI, Inc.; [www.bicsi.org](http://www.bicsi.org).
47. BIFMA - Business and Institutional Furniture Manufacturer's Association; [www.bifma.org](http://www.bifma.org).
48. BISSC - Baking Industry Sanitation Standards Committee; [www.bissc.org](http://www.bissc.org).
49. BWF - Badminton World Federation; [www.bwfbadminton.com](http://www.bwfbadminton.com).
50. CARB - California Air Resources Board; [www.arb.ca.gov](http://www.arb.ca.gov).
51. CDA - Copper Development Association Inc.; [www.copper.org](http://www.copper.org).
52. CE - Conformance Européenne (European Commission); [www.ec.europa.eu/growth/single-market/ce-marking](http://www.ec.europa.eu/growth/single-market/ce-marking).
53. CEA - Canadian Electricity Association; [www.electricity.ca](http://www.electricity.ca).
54. CFFA - Chemical Fabrics and Film Association, Inc.; [www.chemicalfabricsandfilm.com](http://www.chemicalfabricsandfilm.com).
55. CFSEI - Cold-Formed Steel Engineers Institute; [www.cfsei.org](http://www.cfsei.org).
56. CGA - Compressed Gas Association; [www.cganet.com](http://www.cganet.com).
57. CIMA - Cellulose Insulation Manufacturers Association; [www.cellulose.org](http://www.cellulose.org).
58. CISCA - Ceilings & Interior Systems Construction Association; [www.cisca.org](http://www.cisca.org).
59. CISPI - Cast Iron Soil Pipe Institute; [www.cispi.org](http://www.cispi.org).
60. CLFMI - Chain Link Fence Manufacturers Institute; [www.chainlinkinfo.org](http://www.chainlinkinfo.org).
61. CPA - Composite Panel Association; [www.compositepanel.org](http://www.compositepanel.org).

62. CRI - Carpet and Rug Institute (The); [www.carpet-rug.org](http://www.carpet-rug.org).
63. CRRC - Cool Roof Rating Council; [www.coolroofs.org](http://www.coolroofs.org).
64. CRSI - Concrete Reinforcing Steel Institute; [www.crsi.org](http://www.crsi.org).
65. CSA - CSA Group; [www.csagroup.org](http://www.csagroup.org).
66. CSI - Cast Stone Institute; [www.caststone.org](http://www.caststone.org).
67. CSI - Construction Specifications Institute (The); [www.csiresources.org](http://www.csiresources.org).
68. CSSB - Cedar Shake & Shingle Bureau; [www.cedarbureau.org](http://www.cedarbureau.org).
69. CTA - Consumer Technology Association; [www.cta.tech](http://www.cta.tech).
70. CTI - Cooling Technology Institute; [www.coolingtechnology.org](http://www.coolingtechnology.org).
71. DASMA - Door and Access Systems Manufacturers Association; [www.dasma.com](http://www.dasma.com).
72. DHA - Decorative Hardwoods Association; [www.decorativehardwoods.org](http://www.decorativehardwoods.org).
73. DHI - Door and Hardware Institute; [www.dhi.org](http://www.dhi.org).
74. ECIA - Electronic Components Industry Association; [www.ecianow.org](http://www.ecianow.org).
75. EIMA - EIFS Industry Members Association; [www.eima.com](http://www.eima.com).
76. EJMA - Expansion Joint Manufacturers Association, Inc.; [www.ejma.org](http://www.ejma.org).
77. EOS/ESD - EOS/ESD Association, Inc.; Electrostatic Discharge Association; [www.esda.org](http://www.esda.org).
78. ESTA - Entertainment Services and Technology Association; [www.esta.org](http://www.esta.org).
79. EVO - Efficiency Valuation Organization; [www.evo-world.org](http://www.evo-world.org).
80. FCI - Fluid Controls Institute; [www.fluidcontrolsinstitute.org](http://www.fluidcontrolsinstitute.org).
81. FGIA - Fenestration and Glazing Industry Alliance; <https://fgiaonline.org>.
82. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); [www.fiba.com](http://www.fiba.com).
83. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); [www.fivb.org](http://www.fivb.org).
84. FM Approvals - FM Approvals LLC; [www.fmapprovals.com](http://www.fmapprovals.com).
85. FM Global - FM Global; [www.fmglobal.com](http://www.fmglobal.com).
86. FRSA - Florida Roofing and Sheet Metal Contractors Association, Inc.; [www.floridarroof.com](http://www.floridarroof.com).
87. FSA - Fluid Sealing Association; [www.fluidsealing.com](http://www.fluidsealing.com).
88. FSC - Forest Stewardship Council U.S.; [www.fscus.org](http://www.fscus.org).
89. GA - Gypsum Association; [www.gypsum.org](http://www.gypsum.org).
90. GS - Green Seal; [www.greenseal.org](http://www.greenseal.org).
91. HI - Hydraulic Institute; [www.pumps.org](http://www.pumps.org).
92. HMMA - Hollow Metal Manufacturers Association; (see NAAMM).
93. IAPSC - International Association of Professional Security Consultants; [www.iapsc.org](http://www.iapsc.org).
94. IAS - International Accreditation Service; [www.iasonline.org](http://www.iasonline.org).
95. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
96. ICEA - Insulated Cable Engineers Association, Inc.; [www.icea.net](http://www.icea.net).
97. ICPA - International Cast Polymer Association (The); [www.theicpa.com](http://www.theicpa.com).
98. ICRI - International Concrete Repair Institute, Inc.; [www.icri.org](http://www.icri.org).
99. IEC - International Electrotechnical Commission; [www.iec.ch](http://www.iec.ch).
100. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); [www.ieee.org](http://www.ieee.org).
101. IES - Illuminating Engineering Society; [www.ies.org](http://www.ies.org).
102. IEST - Institute of Environmental Sciences and Technology; [www.iest.org](http://www.iest.org).
103. IGMA - Insulating Glass Manufacturers Alliance; (see FGIA).
104. IGSHPA - International Ground Source Heat Pump Association; [www.igshpa.org](http://www.igshpa.org).

105. ILI - Indiana Limestone Institute of America, Inc.; [www.ili.ai.com](http://www.ili.ai.com).
106. Intertek - Intertek Group; [www.intertek.com](http://www.intertek.com).
107. ISA - International Society of Automation (The); [www.isa.org](http://www.isa.org).
108. ISFA - International Surface Fabricators Association; [www.isfanow.org](http://www.isfanow.org).
109. ISO - International Organization for Standardization; [www.iso.org](http://www.iso.org).
110. ITU - International Telecommunication Union; [www.itu.int](http://www.itu.int).
111. KCMA - Kitchen Cabinet Manufacturers Association; [www.kcma.org](http://www.kcma.org).
112. LPI - Lightning Protection Institute; [www.lightning.org](http://www.lightning.org).
113. MBMA - Metal Building Manufacturers Association; [www.mbma.com](http://www.mbma.com).
114. MCA - Metal Construction Association; [www.metalconstruction.org](http://www.metalconstruction.org).
115. MFMA - Maple Flooring Manufacturers Association, Inc.; [www.maplefloor.org](http://www.maplefloor.org).
116. MFMA - Metal Framing Manufacturers Association, Inc.; [www.metalframingmfg.org](http://www.metalframingmfg.org).
117. MHI - Material Handling Industry; [www.mhi.org](http://www.mhi.org).
118. MMPA - Moulding & Millwork Producers Association; [www.wmmpa.com](http://www.wmmpa.com).
119. MPI - Master Painters Institute; [www.paintinfo.com](http://www.paintinfo.com).
120. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry, Inc.; [www.msshq.org](http://www.msshq.org).
121. NAAMM - National Association of Architectural Metal Manufacturers; [www.naamm.org](http://www.naamm.org).
122. NACE - NACE International; (National Association of Corrosion Engineers International); (see AMPP).
123. NADCA - National Air Duct Cleaners Association; [www.nadca.com](http://www.nadca.com).
124. NAIMA - North American Insulation Manufacturers Association; [www.insulationinstitute.org](http://www.insulationinstitute.org).
125. NALP - National Association of Landscape Professionals; [www.landscapeprofessionals.org](http://www.landscapeprofessionals.org).
126. NBGQA - National Building Granite Quarries Association, Inc.; [www.nbgqa.com](http://www.nbgqa.com).
127. NBI - New Buildings Institute; [www.newbuildings.org](http://www.newbuildings.org).
128. NCAA - National Collegiate Athletic Association (The); [www.ncaa.org](http://www.ncaa.org).
129. NCMA - National Concrete Masonry Association; [www.ncma.org](http://www.ncma.org).
130. NEBB - National Environmental Balancing Bureau; [www.nebb.org](http://www.nebb.org).
131. NECA - National Electrical Contractors Association; [www.necanet.org](http://www.necanet.org).
132. NeLMA - Northeastern Lumber Manufacturers Association; [www.nelma.org](http://www.nelma.org).
133. NEMA - National Electrical Manufacturers Association; [www.nema.org](http://www.nema.org).
134. NETA - InterNational Electrical Testing Association; [www.netaworld.org](http://www.netaworld.org).
135. NFHS - National Federation of State High School Associations; [www.nfhs.org](http://www.nfhs.org).
136. NFPA - National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org).
137. NFPA - NFPA International; (see NFPA).
138. NFRC - National Fenestration Rating Council; [www.nfrc.org](http://www.nfrc.org).
139. NGA - National Glass Association; [www.glass.org](http://www.glass.org).
140. NHLA - National Hardwood Lumber Association; [www.nhla.com](http://www.nhla.com).
141. NLGA - National Lumber Grades Authority; [www.nlga.org](http://www.nlga.org).
142. NOFMA - National Oak Flooring Manufacturers Association; (see NWFA).
143. NOMMA - National Ornamental & Miscellaneous Metals Association; [www.nomma.org](http://www.nomma.org).
144. NRCA - National Roofing Contractors Association; [www.nrca.net](http://www.nrca.net).
145. NRMCA - National Ready Mixed Concrete Association; [www.nrmca.org](http://www.nrmca.org).
146. NSF - NSF International; [www.nsf.org](http://www.nsf.org).

147. NSI - Natural Stone Institute; [www.naturalstoneinstitute.org](http://www.naturalstoneinstitute.org).
148. NSPE - National Society of Professional Engineers; [www.nspe.org](http://www.nspe.org).
149. NSSGA - National Stone, Sand & Gravel Association; [www.nssga.org](http://www.nssga.org).
150. NTMA - National Terrazzo & Mosaic Association, Inc. (The); [www.ntma.com](http://www.ntma.com).
151. NWFA - National Wood Flooring Association; [www.nwfa.org](http://www.nwfa.org).
152. NWRA - National Waste & Recycling Association; [www.wasterecycling.org](http://www.wasterecycling.org).
153. PCI - Precast/Prestressed Concrete Institute; [www.pci.org](http://www.pci.org).
154. PDI - Plumbing & Drainage Institute; [www.pdionline.org](http://www.pdionline.org).
155. PLASA - PLASA; [www.plasa.org](http://www.plasa.org).
156. PLIB - Pacific Lumber Inspection Bureau; [www.plib.org](http://www.plib.org).
157. PVCPA - Uni-Bell PVC Pipe Association; [www.uni-bell.org](http://www.uni-bell.org).
158. RCSC - Research Council on Structural Connections; [www.boltcouncil.org](http://www.boltcouncil.org).
159. RFCI - Resilient Floor Covering Institute; [www.rfci.com](http://www.rfci.com).
160. RIS - Redwood Inspection Service; (see WWPA).
161. SAE - SAE International; [www.sae.org](http://www.sae.org).
162. SCTE - Society of Cable Telecommunications Engineers; [www.scte.org](http://www.scte.org).
163. SDI - Steel Deck Institute; [www.sdi.org](http://www.sdi.org).
164. SDI - Steel Door Institute; [www.steeldoor.org](http://www.steeldoor.org).
165. SEFA - Scientific Equipment and Furniture Association (The); [www.sefalabs.com](http://www.sefalabs.com).
166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (see ASCE).
167. SIA - Security Industry Association; [www.securityindustry.org](http://www.securityindustry.org).
168. SJI - Steel Joist Institute; [www.steeljoist.org](http://www.steeljoist.org).
169. SMA - Screen Manufacturers Association; [www.smainfo.org](http://www.smainfo.org).
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; [www.smacna.org](http://www.smacna.org).
171. SMPTE - Society of Motion Picture and Television Engineers; [www.smpte.org](http://www.smpte.org).
172. SPFA - Spray Polyurethane Foam Alliance; [www.sprayfoam.org](http://www.sprayfoam.org).
173. SPIB - Southern Pine Inspection Bureau; [www.spib.org](http://www.spib.org).
174. SPRI - Single Ply Roofing Industry; [www.spri.org](http://www.spri.org).
175. SRCC - Solar Rating & Certification Corporation; [www.solar-rating.org](http://www.solar-rating.org).
176. SSINA - Specialty Steel Industry of North America; [www.ssina.com](http://www.ssina.com).
177. SSPC - SSPC: The Society for Protective Coatings; (see AMPP).
178. STI/SPFA - Steel Tank Institute/Steel Plate Fabricators Association; [www.steeltank.com](http://www.steeltank.com).
179. SWI - Steel Window Institute; [www.steelwindows.com](http://www.steelwindows.com).
180. SWPA - Submersible Wastewater Pump Association; [www.swpa.org](http://www.swpa.org).
181. TCA - Tilt-Up Concrete Association; [www.tilt-up.org](http://www.tilt-up.org).
182. TCNA - Tile Council of North America, Inc.; [www.tcnatile.com](http://www.tcnatile.com).
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; [www.kbcdco.tema.org](http://www.kbcdco.tema.org).
184. TIA - Telecommunications Industry Association (The); [www.tiaonline.org](http://www.tiaonline.org).
185. TMS - The Masonry Society; [www.masonrysociety.org](http://www.masonrysociety.org).
186. TPI - Truss Plate Institute; [www.tpinst.org](http://www.tpinst.org).
187. TPI - Turfgrass Producers International; [www.turfgrasssod.org](http://www.turfgrasssod.org).
188. TRI - Tile Roofing Industry Alliance; [www.tilerroofing.org](http://www.tilerroofing.org).
189. UL - Underwriters Laboratories Inc.; [www.ul.org](http://www.ul.org).
190. UL LLC - UL LLC; [www.ul.com](http://www.ul.com).

191. USAV - USA Volleyball; [www.usavolleyball.org](http://www.usavolleyball.org).
192. USGBC - U.S. Green Building Council; [www.usgbc.org](http://www.usgbc.org).
193. USITT - United States Institute for Theatre Technology, Inc.; [www.usitt.org](http://www.usitt.org).
194. WA - Wallcoverings Association; [www.wallcoverings.org](http://www.wallcoverings.org).
195. WCLIB - West Coast Lumber Inspection Bureau; (see PLIB).
196. WCMA - Window Covering Manufacturers Association; [www.wcmanet.org](http://www.wcmanet.org).
197. WDMA - Window & Door Manufacturers Association; [www.wdma.com](http://www.wdma.com).
198. WI - Woodwork Institute; [www.woodworkinstitute.com](http://www.woodworkinstitute.com).
199. WSRCA - Western States Roofing Contractors Association; [www.wsrca.com](http://www.wsrca.com).
200. WWPA - Western Wood Products Association; [www.wwpa.org](http://www.wwpa.org).
- 201.

- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; [www.din.de](http://www.din.de).
2. IAPMO - International Association of Plumbing and Mechanical Officials; [www.iapmo.org](http://www.iapmo.org).
3. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
4. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).

- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. CPSC - U.S. Consumer Product Safety Commission; [www.cpsc.gov](http://www.cpsc.gov).
2. DOC - U.S. Department of Commerce; [www.commerce.gov](http://www.commerce.gov).
3. DOD - U.S. Department of Defense; [www.defense.gov](http://www.defense.gov).
4. DOE - U.S. Department of Energy; [www.energy.gov](http://www.energy.gov).
5. DOJ - U.S. Department of Justice; [www.ojp.usdoj.gov](http://www.ojp.usdoj.gov).
6. DOS - U.S. Department of State; [www.state.gov](http://www.state.gov).
7. EPA - United States Environmental Protection Agency; [www.epa.gov](http://www.epa.gov).
8. FAA - Federal Aviation Administration; [www.faa.gov](http://www.faa.gov).
9. GPO - U.S. Government Publishing Office; [www.gpo.gov](http://www.gpo.gov).
10. GSA - U.S. General Services Administration; [www.gsa.gov](http://www.gsa.gov).
11. HUD - U.S. Department of Housing and Urban Development; [www.hud.gov](http://www.hud.gov).
12. LBNL - Lawrence Berkeley National Laboratory; Energy Technologies Area; [www.lbl.gov/](http://www.lbl.gov/).
13. NIST - National Institute of Standards and Technology; [www.nist.gov](http://www.nist.gov).
14. OSHA - Occupational Safety & Health Administration; [www.osha.gov](http://www.osha.gov).
15. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; [www.trb.org](http://www.trb.org).
16. USACE - U.S. Army Corps of Engineers; [www.usace.army.mil](http://www.usace.army.mil).
17. USDA - U.S. Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; [www.ars.usda.gov](http://www.ars.usda.gov).
18. USDA - U.S. Department of Agriculture; Rural Utilities Service; [www.usda.gov](http://www.usda.gov).
19. USP - U.S. Pharmacopeial Convention; [www.usp.org](http://www.usp.org).

20. USPS - United States Postal Service; [www.usps.com](http://www.usps.com).

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from U.S. Government Publishing Office; [www.govinfo.gov](http://www.govinfo.gov).
2. DOD - U.S. Department of Defense; Military Specifications and Standards; Available from DLA Document Services; [www.dsp.dla.mil/Specs-Standards/](http://www.dsp.dla.mil/Specs-Standards/).
3. DSCC - Defense Supply Center Columbus; (see FS).
4. FED-STD - Federal Standard; (see FS).
5. FS - Federal Specification; Available from DLA Document Services; [www.dsp.dla.mil/Specs-Standards/](http://www.dsp.dla.mil/Specs-Standards/).
  - a. Available from Defense Standardization Program; [www.dsp.dla.mil](http://www.dsp.dla.mil).
  - b. Available from U.S. General Services Administration; [www.gsa.gov](http://www.gsa.gov).
  - c. Available from National Institute of Building Sciences/Whole Building Design Guide; [www.wbdg.org](http://www.wbdg.org).
6. MILSPEC - Military Specification and Standards; (see DOD).
7. USAB - United States Access Board; [www.access-board.gov](http://www.access-board.gov).
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (see USAB).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

## **SECTION 014339 – MOCKUPS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes mockups for integrated systems and components which include products and materials, including the following:
  - 1. Specific room type mockups.
- B. Related Sections:
  - 1. Division 2 through 49 for additional mockups of individual products or components.

#### **1.2 DEFINITIONS**

- A. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; to demonstrate compliance with specified installation tolerances; to assess conformance with historic fabric and character; and for layout or design verification. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
  - 1. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

#### **1.3 ACTION SUBMITTALS**

- A. Shop Drawings: For each mockup, provide plans, sections, and elevations, indicating materials and size of mockup construction.
  - 1. Indicate manufacturer and model number of individual components.
  - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- B. Shop Drawings and Submittals for Materials: Provide those required for specific Division 02 through 49 specification Sections prior to starting mockup.
- C. Samples: Refer to specific Division 02 through 49 specification Sections.
- D. Mockup: Provide as many modifications to the mockup(s) as required to achieve Architect's and / or Owner's approval at no additional cost.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each product from the source supplying materials and products that are not part of the mock-up
- B. Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work as follows:
  - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
  - 2. Notify Architect fourteen days in advance of dates and times when mockups will be constructed.
  - 3. Provide schedule of construction , determine when specific subcontractor(s) will be on site, allow for site meetings throughout the process for problem solving and coordination
  - 4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction of the Project.
  - 5. Demonstrate the proposed range of aesthetic effects and workmanship.
  - 6. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  - 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 8. Accepted mock-up may be incorporated in the final Work, as long as it remains undisturbed.
  - 9. No work on building elements included in any mockup shall commence without Architect's written approval of relevant mockup
- C. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to for constructing mockups.
  - 2. Review submittals and confirm understandings of markups, comments and actions associated with their review.
  - 3. Confirm schedule of mock-up construction with Owner, Architect, and related Contractors.
  - 4. Include all concerned parties, including subcontractors, manufacturer's representatives, and consultants, as required.

#### 1.5 PROJECT CONDITIONS

- A. Do not install products or materials that are wet, moisture damaged, or mold damaged.

#### 1.6 COORDINATION

- A. Coordinate construction of mockups to ensure timely approval and facilitate ordering of materials for incorporation in the Work.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Provide materials, components, and products for each integrated or room assembly mock-up as specified in individual Specification Sections.
- B. All materials shall be new and purchased specifically for the project.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Approval of mockups is for visual characteristics of material and construction, and other qualities specifically and approved by Architect in writing.
  - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
  - 2. Proceed with installation only after unsatisfactory conditions have been corrected and resolved.
- B. Provide ongoing access to mockups (room, or other) during its construction and throughout the Project by Owner's additional Contractors/Forces, to allow for F.F.& E. mockups and installations; and for other uses requested.

### 3.3 ROOM MOCKUPS

- A. Room Mockups: Construct room mockups incorporating required materials and assemblies, finished in accordance with requirements. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of the Work. Provide room mockups of the following rooms:
  - 1. Provide mockup of finishes in a typical toilet room. Locate at Room #231 in Purington Hall.
- B. Mockup shall include the following:
  - 1. Wall, floor and ceiling finishes (including selected colors).
  - 2. Window trim.
  - 3. Showers accessories
  - 4. Electrical receptacles (need not be energized),
- C. Timing: Complete mockup by the date indicated in the approved in the Project Schedule, if not included in Schedule, as required by Architect.
- D. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### 3.4 PROTECTION

- A. Protect mockups from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

END OF SECTION 014339

## **SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS**

### **PART 1 - GENERAL**

#### **1.1 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.

#### **1.2 USE CHARGES**

- A. Water Service: Owner will pay water-service use charges for water used by all entities for construction operations.
- B. Electric Power Service: Owner will pay electric-power-service use charges for electricity used by all entities for construction operations.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
- B. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
- C. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.
- D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:
  - 1. Locations of dust-control partitions at each phase of work.
  - 2. HVAC system isolation schematic drawing.
  - 3. Location of proposed air-filtration system discharge.
  - 4. Waste-handling procedures.
  - 5. Other dust-control measures.

- E. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements to protect install concrete and masonry.

#### 1.4 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.
- B. Use of new heating or cooling system components, during the construction period, will be allowed.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete or galvanized steel bases for supporting posts.
- B. Lumber and Plywood: Comply with requirements in Division 06 Section "Rough Carpentry."
- C. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.
- D. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- E. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
- F. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

#### 2.2 TEMPORARY FACILITIES

- A. General:
  - 1. Project meetings will be held in the existing buildings; no construction trailer is required.

2. Storage trailers are not required; materials and equipment may be stored inside of the building as long as existing building fabric to remain does not get damaged

## 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

## PART 3 - EXECUTION

### 3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
  1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

### 3.2 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.

### 3.3 TEMPORARY UTILITY INSTALLATION

- A. Water Service: Provide hoses to connect into water hose bib if required for the Work.
- B. Electricity is available on site and may be used by Contractor at no charge. Do not overload circuits. Provide extension cords if required for the Work. Provide portable generator if power above and beyond that available is required for the Work. Provide supplementary plug-in task lighting and special lighting necessary to perform the Work.

- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
- E. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
  - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- F. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
- G. Telephone Service: Provide temporary cellular telephone service with voice mail throughout construction period.

### 3.4 SUPPORT FACILITIES INSTALLATION

- A. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- B. Temporary Signs: Provide signs as required to inform public and individuals of the construction area. Provide temporary, directional signs for construction personnel and visitors.
- C. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
- D. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- E. Temporary Elevator Use: Use of elevators is not permitted.

- F. Temporary Use of Permanent Stairs: Use of existing stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion. Owner will designate which stair may be used by Contractor.

### 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
  - 1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- D. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
  - 1. Extent of Fence: As required to completely enclose the working area.
  - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
- E. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
  - 2. When windows and doors are removed from existing openings, provide plywood and wood framed temporary windows and doors that provide security for the building at all times. Do not restrict egress from building.

- H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

### 3.6 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
2. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
3. Indicate methods to be used to avoid trapping water in finished work.

- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.

7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  2. Use temporary heating system, or permanent HVAC system if allowed by Owner, to control humidity within ranges specified for installed and stored materials.
  3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    - c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

### 3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. 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. Materials and facilities that constitute temporary facilities are property of Contractor.

2. 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 SUMMARY**

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
  - 1. Section 012300 "Alternates" for products selected under an alternate
  - 2. Section 012500 "Substitution Procedures" for requests for substitutions.
  - 3. Section 014200 "References" for applicable industry standards for products specified.

#### **1.2 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.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

#### **1.3 ACTION SUBMITTALS**

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

- a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
- b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.
- C. Asbestos-Containing Products Certification: Submit certification that no asbestos containing materials have been used in the construction of this project, in conformance to AHERA (Asbestos Hazard Emergency Response Act)

#### 1.4 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. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
  2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.
- B. Mechanical Materials and Equipment: When two or more items of same material or equipment are required (pumps, valves, air conditioning units, etc.), they shall be of the same manufacturer. Product manufacturer uniformity does not apply to raw materials, bulk materials, pipe, tube, fittings (except flanged and grooved types), sheet metal, wire, steel bar stock, welding rods, solder, fasteners, motors for dissimilar equipment units, and similar items used in the work, except as otherwise indicated. Provide products which are compatible within systems and other connected items.
- C. Asbestos in Materials: All products submitted for use and incorporated into this project shall be asbestos free.
  1. Asbestos containing materials are not to be purchased or installed in this project. Comply with AHERA (Asbestos Hazard Emergency Response Act) and provide certification that no asbestos containing materials have been used in the construction of this project.
- D. Mercury-Free Products: All products submitted for use and incorporated into this Project shall be mercury-free. In the absence of mercury-free products, provide products with the lowest amount of mercury possible.
- E. Lead-Free Products: All products submitted for use and incorporated into this Project shall be lead-free.

## 1.5 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.
  - 7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

## 1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

## PART 2 - PRODUCTS

### 2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
7. A named product and model number establishes the characteristics and salient features of the specifications even when they are not fully described and will serve as the basis of comparison.
8. Whenever a material, article, device, piece of equipment or type of construction is identified by reference to manufacturers' or vendors' names, trade names, catalog numbers, or similar specific information, it is so identified for the purpose of establishing a standard of quality, and such identification shall not be construed as limiting competition. Comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Named Product: Where Specifications name a single manufacturer and product, and "no substitutions" is indicated, provide the named product. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Named Manufacturer/Source: Where Specifications name a single manufacturer or source and "no substitutions" is indicated, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

3. Products:

- a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- b. Nonrestricted List: Where Specifications include a list of names of both manufacturers and products and "or equal" is specified, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product

4. Manufacturers:

- a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

- 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following

conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, 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. Evidence that the proposed product will not adversely affect Contractor's construction schedule.
3. Evidence that the proposed product has received necessary approvals of authorities having jurisdiction.
4. Evidence that the proposed product will have no adverse effect on other trades and will not affect or delay progress schedule; or if proposed product involves more than one contractor, proposed product has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
5. Evidence that the proposed product maintenance service and source of replacement parts, as applicable, is available similar to the specified product.
6. 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.
7. Evidence that proposed product provides specified warranty.
8. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
9. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

## **SECTION 017300 - EXECUTION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Installation of the Work.
  - 2. Progress cleaning.
  - 3. Starting and adjusting.
  - 4. Protection of installed construction.
  - 5. Correction of the Work.
- B. Related Requirements:
  - 1. Section 011000 "Summary" for limits on use of Project site.
  - 2. Section 013300 "Submittal Procedures" for submitting surveys.
  - 3. Section 017329 "Cutting and Patching" for cutting and patching portions of the building.
  - 4. 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.

#### **1.2 QUALITY ASSURANCE**

- A. 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.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. 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.
- B. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work.
  2. List of detrimental conditions, including substrates.
  3. List of unacceptable installation tolerances.
  4. Recommended corrections.
- 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. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

### 3.3 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 without ceilings.
- 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. Anchors and Fasteners: provide anchors and fasteners and required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
  - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  - 2. Allow for building movement, including thermal expansion and contraction and acoustic isolation between construction systems (AIC and AIJ).
  - 3. Coordinate installation of anchorages. Furnishes 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.
  - 4. Provide metal fastenings and accessories in same texture, color and finish as adjacent materials, unless otherwise indicated.
  - 5. Prevent electrolytic action between dissimilar metal and materials.
  - 6. Space anchors within their load limit or shear capacity and ensure they provide positive permanent anchorage. Wood, or any other organic material plugs are not acceptable.
  - 7. Keep expose fastenings to a minimum, space evenly and install neatly.
  - 8. Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.
  - 9. Use non-corrosive, hot-dipped galvanized steel fasteners and anchors for securing exterior work, unless stainless steel or other material is specifically requested in the affected specification section.
- I. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

J. 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.

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

### 3.4 PROGRESS CLEANING

A. General: Clean Project site, public pedestrian paths and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

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 017419 "Construction Waste Management and Disposal."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- 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.

### 3.5 STARTING AND ADJUSTING

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

### 3.6 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.
- C. Protect resilient flooring against marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.
  - 1. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.

2. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.
- D. Protect roofing materials against cuts, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period.
  1. Do not move heavy and sharp objects directly over roof surfaces. Place plywood or hardboard panels over roofing and under objects while they are being moved. Slide or roll objects over panels without moving panels.
- E. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification. Replace or repair damaged labels to Architect's satisfaction or replace component if label cannot be repaired or replaced.

### 3.7 CORRECTION OF THE WORK

- A. Warranty Response Time: The Contractor shall respond and begin to take necessary action within 7 days of receipt of written notification from the Owner. Response time for life safety items, and for building perimeter security shall be within 24 hours of receipt of written notification from the Owner.

END OF SECTION 017300

## **SECTION 017329 – CUTTING AND PATCHING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Cutting and patching.

- B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.

#### **1.2 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.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

- a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

#### **1.4 QUALITY ASSURANCE**

- A. Minimize cutting and patching of work by properly coordinating construction sequences.

- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.
    - d. Fire-suppression systems.
    - e. Mechanical systems piping and ducts.
    - f. Control systems.
    - g. Communication systems.
    - h. Fire-detection and -alarm systems.
    - i. Conveying systems.
    - j. Electrical wiring systems.
    - k. Operating systems of special construction.
  3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
    - a. Water, moisture, or vapor barriers.
    - b. Membranes and flashings.
    - c. Exterior curtain-wall construction.
    - d. Sprayed fire-resistive material.
    - e. Equipment supports.
    - f. Piping, ductwork, vessels, and equipment.
    - g. Noise- and vibration-control elements and systems.
  4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## 1.5 COORDINATION

- A. Coordinate cutting and patching requirements with selective demolition. Removal of portions of existing construction required for the installation or performance of other work may be indicated as selective demolition on the demolition drawings. Cut and patch all construction when not shown on the demolition drawings, or when additional cutting and patching is required after the completion of selective demolition.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
  - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

## PART 3 - EXECUTION

### 3.1 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
  - 1. Cutting and Patching of Existing Roofing System: Contractors performing cutting and patching of the existing roof membrane shall be certified installers by the existing roof membrane manufacturer for their products. When existing roofing system is still under warranty, coordinate all work on the existing roofing system with manufacturer. All cutting and patching work on roofing system shall be performed in a manner that does not void the warranty.
- C. Temporary Support: Provide temporary support of work to be cut.

- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
  - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and

appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

END OF SECTION 017329

## **SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

#### **1.2 DEFINITIONS**

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

#### **1.3 MATERIALS OWNERSHIP**

- A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

## 1.4 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 15 days of date established for commencement of the Work.

## 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with transportation and disposal regulations of authorities having jurisdiction.

## 1.6 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, and waste reduction work plan. Distinguish between demolition and construction waste.
- B. Waste Identification: Indicate anticipated types of demolition and construction waste generated by the Work.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator.

# PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. General: Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

### 1. Construction Waste:

- a. Packaging: Salvage or recycle 100 percent of the following uncontaminated packaging materials:

- 1) Paper.
- 2) Cardboard.
- 3) Boxes.
- 4) Plastic sheet and film.
- 5) Polystyrene packaging.
- 6) Wood crates.
- 7) Wood pallets.
- 8) Plastic pails.

- b. Construction Office Waste: Salvage or recycle 100 percent of the following construction office waste materials:

- 1) Paper.
- 2) Aluminum cans.

3) Glass containers.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
  - 1. Comply with operation, termination, and removal requirements in Section 015000 "Temporary Facilities and Controls."
  - 2. Review waste management procedures with all entities when they first begin work on-site, including locations established for salvage, recycling, and disposal.
- B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.

END OF SECTION 017419

## **SECTION 017700 - CLOSEOUT PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion.
  - 2. Architect's Review.
  - 3. Final Completion.
  - 4. Warranties.
  - 5. Final cleaning.
  - 6. Repair of the Work.
- B. Related Requirements:
  - 1. Section 012900 "Payment Procedures" for Application for Payment and Final Completion.
  - 2. Section 013100 "Project Management and Coordination" for Project Closeout Meeting.
  - 3. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
  - 4. Section 017300 "Execution" for progress cleaning of Project site.
  - 5. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 6. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 7. Division 02 through 33 Sections for specific closeout and special cleaning requirements.

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

#### **1.3 CLOSEOUT SUBMITTALS**

- A. As required per Division 01 through 33 Section.

## 1.4 SCHEDULE

- A. Contractor shall include on Project Schedule start and completion dates for Substantial Completion, Architect's review and Final Completion.
- B. Architect shall be provided a minimum of ten working days for each review after receipt of request.
- C. Closeout shall successfully conclude prior to Date of Completion.

## 1.5 SUBSTANTIAL COMPLETION

- A. Complete and submit the following a minimum of ten days prior to requesting Architect's Review to determine the date of Substantial Completion. Items shall be complete.
  - 1. Prepare and submit a punch list of items to be completed or corrected. Include a value of the work and the reason why it is incomplete or needs correction.
  - 2. 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.
    - a. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
    - b. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
    - c. Include the following information at the top of each page:
      - 1) Project name.
      - 2) Date.
      - 3) Name of Architect.
      - 4) Name of Contractor.
      - 5) Page number.
  - 3. Advise Owner in writing of pending insurance change over requirements.
  - 4. Prepare and submit closeout submittals specified in Division 1, including but not limited to warranties, record documents, and manuals.
  - 5. Submit closeout submittals specified in individual Sections, including but not limited to, warranties, workmanship bonds, maintenance service agreements, certifications, and similar documents.
  - 6. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities, including but not limited to Certificate of Occupancy, approvals of public and private entities having jurisdiction, operating certificates and completion of commissioning.
  - 7. Prepare and submit a Schedule of Maintenance Materials specified in individual Sections. Maintenance Materials including but are not limited to extra materials, tools, and spare parts. Schedule shall identify Specification Section, item name,

- quantity and manufacturer's information including contact information, item identification, data sheets and special storage requirements.
8. Submit test/adjust/balance reports including a notarized letter from the Contractor indicating that all systems are complete.
  9. Make final changeover of permanent locks and deliver keys to Owner with a list indicating which key opens which lock(s) utilizing final room numbering.
  10. Instruct Owner's personnel in operation, adjustment and maintenance of products, equipment and systems. Submit documentation that Owner training has been successfully completed.
  11. Advise Owner in writing of utility changeovers.
  12. Participate with Owner's personnel in conducting inspection and walkthrough with local emergency responders.
  13. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  14. Complete final cleaning requirements, including touch-up paint.
  15. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. 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, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect 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 Architect, that must be completed or corrected before certificate will be issued.
1. Architect will perform one inspection per Prime Contract for all of the work covered by a Substantial Completion date; other inspections, including partial inspections, shall be compensated by the Contractor
  2. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
    - a. Reinspection Limits: The Architect is limited to performing the original inspection and two reinspections of the same area as part of their services. The cost of any reinspections required beyond this amount will be borne by the Contractor. Contractor shall reimburse Owner for reinspection fees paid to the Architect through a credit change order in the amount stipulated by the Owner
  3. Results of completed inspection will form the basis of requirements for final completion.

## 1.6 ARCHITECT'S REVIEW

- A. Submit a written request for the Architect's Review to determine the date of Substantial Completion. Contractor shall have completed the requirements of Substantial Completion a minimum of ten days prior to this request.
1. Architect will either proceed with the Review or notify the Contractor of unfulfilled requirements.

2. When the Architect proceeds, they will review the Project and submit a punch list of items that are incomplete and/or requiring correction. The punch list will be provided as a PDF electronic file.
3. Along with the punch list the Architect shall issue the Certificate of Substantial Completion or indicate to the Contractor what items must be completed on the provided Punch List before it will be issued.
4. The date that the Certificate of Substantial Completion is issued shall be the start date of the warranty periods specified.

## 1.7 FINAL COMPLETION

- A. 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. Submit certified copy of Architect's punch list, endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  4. Provide documentation that all items on the Schedule of Maintenance Materials have been provided.
- B. Inspection: Submit a written request for final review to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final review and tests. On receipt of request, Architect will either proceed with review or notify Contractor of unfulfilled requirements. Architect 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 reviews as incomplete is completed or corrected.
- C. Re-Inspection Fees:
  1. If the Architect performs re-inspections due to failure of the work to comply with the claims of status of completion made by the Contractor, or, should the Contractor fail to complete the work, or, should the Contractor fail to promptly correct warranty items or work later found to be deficient:
    - a. Owner will compensate Architect for such additional services.
    - b. Owner will deduct the amount of such compensation from the final payment to the Contractor.
  2. If the Work is not completed by the date set in the agreement, and the Architect needs to perform additional Contract Administrative and on site observation duties:

- a. Owner will compensate Architect for such additional services.
- b. Owner will deduct the amount of such compensation from the final payment to the Contractor.

## 1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect 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.
  1. Unless indicated otherwise, all warranties shall commence on the date of Substantial Completion.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranties in Paper Form:
  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. Submit final warranties as a package for the entire project, assembled and identified as described below.
  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.
  4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.
- F. Warranty Response Time: The Contract shall respond and begin to take necessary action within 7 days of receipt of written notification from the Owner. Response time for life safety items, and for building perimeter security shall be within 24 hours of receipt of written notification from the Owner.

## 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. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    - j. Resilient flooring shall be scrubbed and cleaned with cleaner recommended by the flooring manufacturer just prior to occupation by

Owner. No-wax floors shall be cleaned and buffed in accordance with flooring manufacturer's requirements.

- k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces. Cleaning of windows shall be done just before Owner occupancy.
- l. Remove labels that are not permanent.
- m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
  - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
- q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
- r. Leave Project clean and ready for occupancy.

- C. Construction Waste Disposal: Comply with waste disposal requirements in Section 017419 "Construction Waste Management and Disposal."

### 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 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.

### 3.3 GUARANTEES

- A. Neither the final requisition for payment nor any provision in the Contract Documents nor partial or entire use or occupancy of the building by the Owner shall constitute an acceptance of work done in accordance with the Contract Documents or relieve the Contractor of liability in respect to express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting therefrom which shall appear within one year from the date of final acceptance unless a longer period is specified. The Owner will give notice of observed defects with reasonable promptness.
- B. Although subcontractors shall, throughout these Specifications, be required to provide guarantees for their respective work, the Contractor, in the last analysis, shall be responsible for all work and the guarantee thereof. In the case of disputes between subcontractors as to fault of problems, it is up to the Contractor to resolve these disputes or accept the cost of repair or replacement himself.

END OF SECTION 017700

## **SECTION 017823 - OPERATION AND MAINTENANCE DATA**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

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

#### **1.2 CLOSEOUT SUBMITTALS**

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect 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 operation and maintenance manuals in the following formats:
  - 1. Submit by email to Architect. Enable reviewer comments on draft submittals.
  - 2. Submit one paper copy.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. 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. Architect will return copy with comments.
  - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

### 1.3 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. 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: Bookmark 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.
- B. 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 or post-type 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, and subject matter of contents, and indicate Specification Section number on bottom of spine. 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. Enclose title pages and directories in clear plastic sleeves.
  - 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.

#### 1.4 PRODUCT MAINTENANCE MANUALS

- 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. 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.
- C. 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.
- D. 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.
- E. 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.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. 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 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

## **SECTION 017839 - PROJECT RECORD DOCUMENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Miscellaneous record submittals.
  - 5. Directories.
- B. Related Requirements:
  - 1. Section 017700 "Closeout Procedures" for general closeout procedures.
  - 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

#### **1.2 CLOSEOUT SUBMITTALS**

- A. Submit all project record documents as one submittal package.
- B. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set of marked-up record prints.
- C. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.
- D. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
  - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- E. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- F. Reports: Submit written report monthly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

### 1.3 RECORD DRAWINGS

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

#### 1.4 RECORD SPECIFICATIONS

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

#### 1.5 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as annotated PDF electronic file.
  1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

## 1.6 DIRECTORIES

- A. Directories: Contractor/Subcontractor directory.
  - 1. Submit one hard copy and one copy on USB storage device in PDF format.
- B. Directory: Name, address and telephone number for General Contractor, all major subcontractors, organized by specification section. Provide a separate list in alphabetical order.

## 1.7 MISCELLANEOUS RECORD SUBMITTALS

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

## 1.8 RECORDING AND MAINTENANCE

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

## **SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION AND REMOVALS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Demolition and removal of selected portions of a building or structure.
2. Salvage of selected building components and elements.
3. Repair procedures for selective demolition operations.

B. Related Sections include the following:

1. Division 01 General Requirements for temporary construction and environmental-protection measures for selective demolition operations.
2. Division 01 General Requirements for cutting and patching procedures for selective demolition operations.

#### **1.2 DEFINITIONS**

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

#### **1.3 MATERIALS OWNERSHIP**

- A. Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

#### **1.4 SUBMITTALS**

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- B. Proposed Dust-Control, Noise-Control and Other Special Measures: Submit statement or drawing that indicates the measures proposed for use, proposed locations, and proposed time frame for their operation. Identify options if proposed measures are later determined to be inadequate.
- C. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
- D. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- E. Predemolition Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.

#### 1.5 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Professional Engineer Qualifications: Comply with Division 01 General Requirements.
- C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Standards: Comply with ANSI A10.6 and NFPA 241.
- E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 01 General Requirements.

#### 1.6 PROJECT CONDITIONS

- A. Owner will occupy portions of site and buildings immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted. Provide not less than 2 weeks' notice to Owner of activities that will affect Owner's operations.
- B. Owner may elect to salvage certain items from areas of construction other than those indicated on Drawings as "salvage" prior to selective demolition operations. Give 2 weeks notice to Owner prior to commencing any selective demolition processes to allow for Owner salvage operations.

- C. Maintain access to existing walkways, roadways, and other adjacent occupied or used facilities.
  - 1. Do not close or obstruct walkways, roadways, or other occupied or used facilities without written permission from authorities having jurisdiction.
- D. Owner assumes no responsibility for condition of areas to be selectively demolished.
  - 1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- E. Hazardous Materials: Remediation of existing hazardous materials, if any, will be completed prior to commencement of selective demolition in the areas where hazardous materials are present.
  - 1. If materials suspected of containing hazardous materials that have not been previously identified in the Contract Documents are encountered, do not disturb; immediately notify Architect and Owner.
  - 2. A hazardous materials report is included in the Specifications for information only.
- F. Storage or sale of removed items or materials on-site will not be permitted.
- G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

## PART 2 - PRODUCTS

### 2.1 REPAIR MATERIALS

- A. Use repair materials identical to existing materials.
  - 1. If identical materials are unavailable or cannot be used for exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
  - 2. Use materials whose installed performance equals or surpasses that of existing materials.
- B. Comply with material and installation requirements specified in individual Specification Sections.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.

- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

### 3.2 UTILITY SERVICES

- A. Existing Utilities: Maintain services indicated to remain and protect them against damage during selective demolition operations.
- B. Do not interrupt existing utilities serving occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.
  - 1. Provide at least 2 weeks' notice to Owner if shutdown of service is required during changeover.
- C. Utility Requirements: Locate, identify, disconnect, and seal or cap off indicated utilities serving areas to be selectively demolished.
  - 1. Arrange to shut off indicated utilities with utility companies.
  - 2. If utility services are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary utilities that bypass area of selective demolition and that maintain continuity of service to other parts of building.
  - 3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
  - 4. Do not start selective demolition work until utility disconnecting and sealing have been completed and verified in writing.

### 3.3 PREPARATION

- A. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with selective demolition operations.

- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
  - 2. Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction.
- C. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent site improvements, structures and facilities to remain.
  - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  - 5. Provide special protection measures as required by Owner.
- D. Temporary Enclosures: Provide temporary enclosures for protection of existing building and construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects
- E. Temporary Partitions: Erect and maintain dustproof partitions and temporary enclosures to limit dust and dirt migration and to separate areas from fumes and noise.
- F. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent movement, settlement, or collapse of construction to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  - 1. Strengthen or add new supports when required during progress of selective demolition.

### 3.4 POLLUTION CONTROLS

- A. Dust Control: Use water mist, temporary enclosures, and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.
  - 1. Do not use water when it may damage existing construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- B. Disposal: Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  - 1. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- C. Cleaning: Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

### 3.5 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
  - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  - 5. Maintain adequate ventilation when using cutting torches.
  - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  - 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  - 9. Dispose of demolished items and materials promptly.
  - 10. Return elements of construction and surfaces that are to remain to condition existing before selective demolition operations began.
- B. Removed and Salvaged Items: Comply with the following:

1. Clean salvaged items.
  2. Pack or crate items after cleaning. Identify contents of containers.
  3. Store items in a secure area until delivery to Owner.
  4. Transport items to Owner's storage area designated by Owner.
  5. Protect items from damage during transport and storage.
- C. Removed and Reinstalled Items: Comply with the following:
1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
  2. Pack or crate items after cleaning and repairing. Identify contents of containers.
  3. Protect items from damage during transport and storage.
  4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Salvage items indicated on the Drawings as "salvage".
- E. Existing Facilities: Comply with Owner's requirements for using and protecting elevators, stairs, walkways, building entries, and other building facilities during selective demolition operations.
- F. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.
- G. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
- H. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- I. Brick Masonry and Cast Stone to be Salvaged: Carefully dismantle brick veneer and cast stone trim at exterior walls where demolition is indicated. Salvage existing removed brick and cast stone for reuse. Remove mortar, anchors, and ties from brick masonry and cast stone. Clean and stack undamaged, whole brick masonry and cast stone units on wood pallets and provide weatherproof covering. Locate stored brick and cast stone where directed by Architect.
- J. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- K. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

### 3.6 PATCHING AND REPAIRS

- A. General: Promptly repair damage to adjacent construction caused by selective demolition operations.
- B. Patching: Comply with Division 01 Section "Cutting and Patching."
- C. Repairs: Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.
  - 1. Completely fill holes and depressions in existing masonry walls that are to remain with an approved masonry patching material applied according to manufacturer's written recommendations.
- D. Finishes: Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.
- E. Floors and Walls: Where walls or partitions that are demolished extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
  - 1. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
  - 2. Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing patch. Provide additional coats until patch blends with adjacent surfaces.
  - 3. Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
- F. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
- G. Roof Coverings: Patch and repair existing roof covering system to match existing construction and to provide a watertight finished roof covering. If roof system is still under warranty, work must be performed by roof system manufacturer's approved and certified installer in accordance with all roof manufacturer's requirements to maintain warranty.

### 3.7 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
- B. Burning: Do not burn demolished materials.

- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

END OF SECTION 024119

## **SECTION 032000 - CONCRETE REINFORCING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

#### **1.2 ACTION SUBMITTALS**

**A. Product Data:** For the following:

1. Each type of steel reinforcement.
2. Bar supports.
3. Mechanical splice couplers.

**B. Shop Drawings:** Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

**C. Construction Joint Layout:** Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of Architect.

#### **1.3 INFORMATIONAL SUBMITTALS**

**A. Welding certificates.**

1. Reinforcement to Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M.

**B. Material Certificates:** For each of the following, signed by manufacturers:

1. Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."

**C. Material Test Reports:** For the following, from a qualified testing agency:

1. Steel Reinforcement:

- a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.
2. Mechanical splice couplers.

## PART 2 - PRODUCTS

### 2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

### 2.2 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
  1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
    - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
    - b. For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
    - c. For dual-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.
    - d. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.
    - e. For stainless steel reinforcement, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- B. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.

### 2.3 FABRICATING REINFORCEMENT

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

## PART 3 - EXECUTION

### 3.1 PREPARATION

#### A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. Repair damage and reseal vapor retarder before placing concrete.

#### B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

### 3.2 INSTALLATION OF STEEL REINFORCEMENT

#### A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

#### B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

#### C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

#### D. Provide concrete coverage in accordance with ACI 318.

#### E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

#### F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 36 bar diameters at splices, or 24 inches, whichever is greater.
2. Stagger splices in accordance with ACI 318.

#### G. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
  - a. For reinforcement less than W4.0 or D4.0, continuous support spacing to not exceed 12 inches.
2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.

4. Lace overlaps with wire.

### 3.3 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  1. Place joints perpendicular to main reinforcement.
  2. Continue reinforcement across construction joints unless otherwise indicated.
  3. Do not continue reinforcement through sides of strip placements of floors and slabs.

### 3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117.

### 3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
  1. Steel-reinforcement placement.

END OF SECTION 032000

## **SECTION 033000 - CAST-IN-PLACE CONCRETE**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

**B. Related Requirements:**

1. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

#### **1.2 DEFINITIONS**

- A. Cementitious Materials:** Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.

- B. Water/Cement Ratio (w/cm):** The ratio by weight of water to cementitious materials.

#### **1.3 ACTION SUBMITTALS**

**A. Product Data:** For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Aggregates.
6. Admixtures:

- a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

7. Vapor retarders.
8. Liquid floor treatments.
9. Curing materials.
10. Joint fillers.

**B. Design Mixtures:** For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
  - a. Location of construction joints is subject to approval of the Architect.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

#### 1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Vapor retarders.
5. Joint-filler strips.

B. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Aggregates.

6. Admixtures:

- C. Research Reports: For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
- D. Preconstruction Test Reports: For each mix design.
- E. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
  - 1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.

1.7 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

- A. Cementitious Materials:
  - 1. Portland Cement: ASTM C150/C150M, Type I/II.
  - 2. Fly Ash: ASTM C618, Class C or F.
  - 3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C33/C33M, coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
  2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Air-Entraining Admixture: ASTM C260/C260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
  2. Retarding Admixture: ASTM C494/C494M, Type B.
  3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
  5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
  6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- E. Water and Water Used to Make Ice: ASTM C94/C94M, potable

## 2.3 VAPOR RETARDERS

- A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

## 2.4 LIQUID FLOOR TREATMENTS

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

## 2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
1. Color:
    - a. Ambient Temperature Below 50 deg F: Black.
    - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
    - c. Ambient Temperature Above 85 deg F: White.
- C. Curing Paper: 8-foot-wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.

- D. Water: Potable or complying with ASTM C1602/C1602M.

## 2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.

## 2.7 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
  - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
  - 1. Fly Ash or Other Pozzolans: 25 percent by mass.
  - 2. Slag Cement: 50 percent by mass.
  - 3. Total of Fly Ash or Other Pozzolans, Slag Cement: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass.
  - 4. Total of Fly Ash or Other Pozzolans: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
  - 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs concrete for parking structure slabs, and concrete with a w/cm below 0.50.

## 2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
  - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

### 3.2 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
  - 1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
  - 2. Face laps away from exposed direction of concrete pour.
  - 3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
  - 4. Lap joints 6 inches and seal with manufacturer's recommended tape.
  - 5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
  - 6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
  - 7. Protect vapor retarder during placement of reinforcement and concrete.
    - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

### 3.3 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
  - 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
  - 2. Place joints perpendicular to main reinforcement.
    - a. Continue reinforcement across construction joints unless otherwise indicated.

- b. Do not continue reinforcement through sides of strip placements of floors and slabs.
  - 3. Form keyed joints where indicated. Embed keys at least 1-1/2 inches into concrete.
  - 4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  - 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  - 6. Space vertical joints in walls as indicated on Drawings.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
- 1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  - 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
- E. Doweled Joints:
- 1. Install dowel bars and support assemblies at joints where indicated on Drawings.
  - 2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
- F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

### 3.4 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
- 1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
  - 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
  - 1. If a section cannot be placed continuously, provide construction joints as indicated.
  - 2. Deposit concrete to avoid segregation.
  - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
    - a. Do not use vibrators to transport concrete inside forms.
    - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
  - 1. Do not place concrete floors and slabs in a checkerboard sequence.
  - 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  - 3. Maintain reinforcement in position on chairs during concrete placement.
  - 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
  - 5. Level concrete, cut high areas, and fill low areas.
  - 6. Slope surfaces uniformly to drains where required.
  - 7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
  - 8. Do not further disturb slab surfaces before starting finishing operations.

### 3.5 FINISHING FORMED SURFACES

#### A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
  - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
  - b. Remove projections larger than 1 inch.
  - c. Tie holes do not require patching.
  - d. Surface Tolerance: ACI 117 Class D.
  - e. Apply to concrete surfaces not exposed to public view.
2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
  - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
  - b. Remove projections larger than 1/4 inch.
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 Class B.
  - e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
3. ACI 301 Surface Finish SF-3.0:
  - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
  - b. Remove projections larger than 1/8 inch.
  - c. Patch tie holes.
  - d. Surface Tolerance: ACI 117 Class A.
  - e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

#### B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

### 3.6 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.
3. Apply scratch finish to surfaces to receive concrete floor toppings to receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
7. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

2. Coordinate required final finish with Architect before application.

### 3.7 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

#### A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

- #### B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

#### C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Prior to pouring concrete, place and secure anchorage devices.
  - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - b. Cast anchor-bolt insert into bases.
  - c. Install anchor bolts to elevations required for proper attachment to supported equipment.

- #### D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.

1. Cast-in inserts and accessories, as shown on Drawings.
2. Screed, tamp, and trowel finish concrete surfaces.

### 3.8 CONCRETE CURING

- #### A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h, calculated in accordance with ACI 305.1, before and during finishing operations.

- #### B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.

2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
  - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
  - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
  - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
  - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
  - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
    - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
    - 2) Maintain continuity of coating and repair damage during curing period.

C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:
  - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
    - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
      - a) Lap edges and ends of absorptive cover not less than 12 inches.
      - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
    - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
      - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
      - b) Cure for not less than seven days.

- 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
  - a) Water.
  - b) Continuous water-fog spray.
- b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
  - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
    - a) Lap edges and ends of absorptive cover not less than 12 inches.
    - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
  - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
    - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
    - b) Cure for not less than seven days.
  - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
    - a) Water.
    - b) Continuous water-fog spray.
- c. Floors to Receive Polished Finish: Contractor has option of the following:
  - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
    - a) Lap edges and ends of absorptive cover not less than 12 inches.
    - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
  - 2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

- a) Water.
- b) Continuous water-fog spray.

d. Floors to Receive Chemical Stain:

- 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
- 2) Install curing paper square to building lines, without wrinkles, and in a single length without end joints.
- 3) Butt sides of curing paper tight; do not overlap sides of curing paper.
- 4) Leave curing paper in place for duration of curing period, but not less than 28 days.

e. Floors to Receive Urethane Flooring:

- 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
- 2) Rewet absorptive cover, and cover immediately with polyethylene moisture-retaining cover with edges lapped 6 inches and sealed in place.
- 3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
- 4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.

f. Floors to Receive Curing and Sealing Compound:

- 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
- 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
- 3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

### 3.9 TOLERANCES

- A. Conform to ACI 117.

### 3.10 APPLICATION OF LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.

- 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.

2. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
3. Rinse with water; remove excess material until surface is dry.
4. Apply a second coat in a similar manner if surface is rough or porous.

### 3.11 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
  1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
  2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
  3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
    - a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
      - 1) Project name.
      - 2) Name of testing agency.
      - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
      - 4) Name of concrete manufacturer.
      - 5) Date and time of inspection, sampling, and field testing.
      - 6) Date and time of concrete placement.
      - 7) Location in Work of concrete represented by samples.
      - 8) Date and time sample was obtained.
      - 9) Truck and batch ticket numbers.
      - 10) Design compressive strength at 28 days.
      - 11) Concrete mixture designation, proportions, and materials.
      - 12) Field test results.
      - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
      - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
  - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M:
  - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - b. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete.
  - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M:
  - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31/C31M:
  - a. Cast four (4) standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M.
  - a. Test one lab-cured specimen at 7 days.
  - b. Test two lab-cured specimens at 28 days.
  - c. If either of the 28-day breaks are below design strength, hold the fourth specimen and test at 56 days, otherwise discard.
  - d. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests:
  - a. Testing and inspecting agency to make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
  - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
    - 1) Acceptance criteria for concrete strength to be in accordance with ACI 301, Section 1.6.6.3.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

### 3.12 PROTECTION

#### A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

## **SECTION 034500 - PLANT- PRECAST ARCHITECTURAL CONCRETE**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes the following precast architectural concrete units:
  - 1. Trim units, including wall caps and banding.
- B. Related work specified elsewhere:
  - 1. Division 04 Section "Unit Masonry" for mortar and grout and miscellaneous accessories.

#### **1.2 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Design Mixes: For each concrete mix.
- C. Shop Drawings: Detail fabrication and installation of precast architectural concrete units. Indicate member locations, plans, elevations, dimensions, shapes, cross sections, limits of each finish, and types of reinforcement, including special reinforcement.
  - 1. Indicate locations and details of anchorage devices to be embedded in other construction.
- D. Samples: For each type of finish indicated on exposed surfaces of precast architectural concrete units, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately 12 by 12 by 2 inches.
- E. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
  - 1. Concrete materials.
  - 2. Reinforcing materials.

#### **1.3 QUALITY ASSURANCE**

- A. Fabricator Qualifications: A firm that is experienced in manufacturing precast architectural concrete units similar to those indicated for this Project and with a record of successful in-service performance.
- B. Single Source Responsibility for Installation of Masonry Work: All masonry work shall be performed by a single firm meeting qualifications specified in Section 042000.

- C. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, "PCI Design Handbook--Precast and Prestressed Concrete."
- D. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
- E. Mockups: Include in brick construction mock-up specified in Section 042000.

#### 1.4 PROJECT CONDITIONS

- A. Hot-Weather and Cold-Weather Requirements: Comply with requirements contained in Section 042000.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver precast architectural concrete units to Project site in such quantities and at such times to ensure continuity of installation.
- B. Handle and store units at Project site to prevent cracking, distorting, warping, staining, or other physical damage, and so markings are visible.

#### 1.6 SEQUENCING

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

### PART 2 - PRODUCTS

#### 2.1 MOLD MATERIALS

- A. Molds: Provide molds and, where required, form-facing materials of metal, plastic, wood, or another material that is nonreactive with concrete and dimensionally stable to produce continuous and true precast concrete surfaces within fabrication tolerances and suitable for required finishes
- B. Form Liners: Units of face design, texture, arrangement, and configuration required to produce intended results.

#### 2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

## 2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type III, of same type, brand, and source; grey or white as required to produce color desired.
- B. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S.
- C. Coloring Admixture: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant.
- D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.
- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

## 2.4 STAINLESS-STEEL CONNECTION MATERIALS

- A. Dowels: Stainless steel, ASTM A 666, Type 304, of diameter required to support loads and secure to substrate.

## 2.5 MORTAR AND GROUT MATERIALS

- A. Refer to Section 042000. Provide Type N colored mortar in color as selected by Architect.

## 2.6 MISCELLANEOUS MASONRY ACCESSORIES

- A. Refer to Section 042000 for specifications for anchors and ties.

## 2.7 CONCRETE MIXES

- A. Prepare design mixes for each type of concrete required.
- B. Design mixes may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast architectural concrete fabricator's option.
- C. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318 (ACI 318M).
- D. Normal-Weight Concrete Mixes: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
  - 2. Maximum Water-Cementitious Materials Ratio: 0.45.

- E. Water Absorption: 12 to 14 percent by volume, tested according to PCI MNL 117.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
- G. When included in design mixes, add other admixtures to concrete mixes according to manufacturer's written instructions.
- H. Texture: Match existing.
- I. Color: Match existing.

## 2.8 MOLD FABRICATION

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing operations.
  - 1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concreting. Coat form liner with form-release agent.
- B. Maintain molds to provide completed precast architectural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

## 2.9 FABRICATION

- A. Furnish loose steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast architectural concrete units to supporting and adjacent construction.
- B. Cast-in reglets, slots, holes, and other accessories in precast architectural concrete units to receive lighting components, cramps, dowels, reglets, waterstops, flashings, and other similar work as indicated.
- C. Reinforcement: Comply with recommendations in CRSI's "Manual of Standard Practice" and PCI MNL 117 for fabricating, placing, and supporting reinforcement.
- D. Reinforce precast architectural concrete units to resist handling, transportation, and erection stresses.
- E. Mix concrete according to PCI MNL 117 and requirements in this Section. After concrete batching, no additional water may be added.
- F. Place face mix to a minimum thickness after consolidation of the greater of 1 inch (25 mm) or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover.

- G. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units. Comply with requirements in PCI MNL 117 for measuring, mixing, transporting, and placing concrete.
- H. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items. Use equipment and procedures complying with PCI MNL 117.
- I. Comply with ACI 306.1 procedures for cold-weather concrete placement.
- J. Comply with ACI 305R recommendations for hot-weather concrete placement.
- K. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture.
- L. Discard precast architectural concrete units that are warped, cracked, broken, spalled, stained, or otherwise defective unless repairs are approved by Architect.

## 2.10 FABRICATION TOLERANCES

- A. Fabricate precast architectural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.

## 2.11 FINISHES

- A. Finish exposed-face surfaces of precast architectural concrete units to match approved samples.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine areas indicated to receive pre-cast architectural concrete units with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Examine substrate to verify that dovetail slots, inserts, reinforcement, veneer anchors, flashing, and other items installed in unit masonry or concrete and required for or extending into precast concrete units are correctly installed.
  - 2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the work.
  - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION, GENERAL

- A. Comply with requirements specified in Sections 042000 as they relate to the work of this section.
- B. Set precast concrete units to comply with requirements indicated on Drawings. Install veneer anchors, supports, fasteners, and other attachments indicated or necessary to secure precast concrete units in place. Set precast concrete units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
- C. Anchor to concrete with corrugated-metal veneer anchors as follows:
  - 1. Secure veneer anchors by inserting dovetailed ends into dovetail slots in concrete.
  - 2. Embed veneer anchors in mortar joints to within 1 inch of face.
- D. Space veneer anchors not more than 16 inches o.c. vertically and 16 inches o.c. horizontally. Install additional veneer anchors within 12 inches of openings, sealant joints, and perimeter at intervals not exceeding 8 inches.
- E. Set precast concrete units in full bed of mortar with full head joints, unless otherwise indicated. Build veneer anchors into mortar joints as precast concrete units are set.
- F. Collar Joints in Masonry: Fill the vertical, longitudinal joint between backup and veneer solidly with mortar.
- G. Maintain uniform joint widths.
  - 1. Lay walls with joints in width to match brick joint widths.
- H. Tool exposed joints to a flat, smooth profile when thumbprint hard, using a jointer larger than the joint thickness, to match approved mock-ups.
- I. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
  - 1. Keep expansion and pressure-relieving joints free of mortar and other rigid materials.
  - 2. Sealing expansion, control, and pressure-relieving joints is specified in Division 07 Section "Joint Sealants."
- J. Contiguous Work: Provide reveals, reglets, and openings as required to accommodate contiguous work.

### 3.3 INSTALLATION TOLERANCES

- A. Refer to Section 042000.

### 3.4 ADJUSTING AND CLEANING

- A. Remove and replace precast concrete units of the following description:
  - 1. Broken, chipped, stained, or otherwise damaged precast concrete units. Precast concrete units may be repaired if methods and results are approved by Architect.
  - 2. Defective joints.
  - 3. Precast concrete units not matching approved samples and mockups.
  - 4. Precast concrete units not complying with other requirements indicated.
- B. Replace in a manner that results in precast concrete units matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean precast concrete units as work progresses. Remove mortar fins and smears before tooling joints.
- D. Clean precast concrete units after pointing mortar and sealant has had opportunity to cure, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning agents containing caustic compounds or abrasives, or other materials or methods that could damage precast concrete units.

### 3.5 PROTECTION

- A. Protection: Provide final protection in a manner acceptable to Architect that ensures precast concrete work is without damage and deterioration at the time of final acceptance.

END OF SECTION 034500

## **SECTION 042000 – UNIT MASONRY**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes unit masonry assemblies consisting of the following:
  - 1. Face brick.
  - 2. Mortar and grout.
  - 3. Ties and anchors.
  - 4. Miscellaneous masonry accessories.
  - 5. Embedded flashing.
- B. Products furnished, but not installed, under this Section include the following:
  - 1. Mortar and grout for pre-cast concrete trim installed under Division 04 Section "Pre-cast concrete".

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: For each different masonry unit, mortar material, accessory, and other manufactured product specified.
- B. Samples for Initial Selection: For the following:
  - 1. Colored mortar samples in small-scale form showing the full range of colors and textures available for each different exposed mortar color required.
- C. Samples for Verification: For the following:
  - 1. Full-size units for each different exposed masonry unit required, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction.
  - 2. Colored mortar samples, for each mortar color required, showing the full range expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label samples to indicate type and amount of colorant used
  - 3. Weep holes/vents in color to match mortar color
  - 4. Accessories embedded in the masonry.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- B. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:

1. Each type of masonry unit required. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
  2. Mortar complying with property requirements of ASTM C 270.
- C. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:
1. Each type of masonry unit required.
    - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
  2. Each cement product required for mortar and grout, including name of manufacturer, brand, type, and weight slips at time of delivery.
  3. Each type and size of anchor, tie, and metal accessory.

#### 1.4 QUALITY ASSURANCE

- A. Masonry Standard: Comply with requirements of "Specifications for Masonry Structures, ACI 530.1/ASCE 6/TSM 602" published by the American Concrete Institute, except when more stringent requirements are specified and as modified by the requirements of these Contract Documents.
1. Revise ACI 530.1/ASCE 6/TSM 602 to exclude Article 1.5; Subparagraphs 1.1 C.1 through 4, and Subparagraphs 3.3 E.1 through 5.
- B. Installer Qualifications: Engage an experienced installer who has 10 years experience as a journeymen mason, and who has completed masonry similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
1. A minimum of one skilled journeyman mason shall be present at all times during masonry erection and shall personally direct the work.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1093 to conduct the testing indicated, as documented according to ASTM E 548.
- D. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.
- E. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- F. Mockups: Before installing unit masonry, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Final approval of brick bonding pattern, brick color and texture and mortar color and texture will be made based on acceptance of mock-up. Build

mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Locate mockup in the locations as directed by Architect.
2. Build mockups containing the following types of masonry approximately 96 inches long by 48 inches high by full thickness, including face and backup wythes and accessories. Include a sealant-filled joint at least 16 inches long in the mockup.
  - a. Typical exterior masonry-veneer wall complete with back-up, reinforcing/ties, flashing, and weep holes. Demonstrate all types of brick patterns to be used in the Work in the mock-up. Include pre-cast concrete trim units in the mock-up.
3. Re-prepare mock-ups as required to obtain Architect's approval.
4. Protect accepted mockups from the elements with weather-resistant membrane.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Remove and reconstruct mockups as required to obtain Architect's approval.
7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Coordination."

H. Reference Standards: Comply with Brick Institute of America (BIA) and Masonry Institute of America (MIA) handbooks/Manuals.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

#### 1.6 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three (3) days after building masonry walls or columns
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in Part 1.8 C. of ACI 530.1/ASCE 6/TMS 602.
  - 1. Do not lay masonry units that are wet or frozen.
  - 2. Remove masonry damaged by freezing conditions.
- E. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- F. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Comply with cold-weather construction requirements contained in Part 1.8 D. of ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and wind breaks and use cooled materials as required.
  - 1. When ambient temperature exceeds 100 deg F (38 deg C), or 90 deg F (32 deg C) with a wind velocity greater than 8 mph (13 km/h), do not spread mortar beds more than 48 inches (1200 mm) ahead of masonry. Set masonry units within one minute of spreading mortar.

## PART 2 - PRODUCTS

### 2.1 BRICK

- A. General: Provide shapes indicated and as follows for each form of brick required:
  - 1. Provide units without cores or frogs and with exposed surfaces finished for ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces.
  - 2. Provide lipped brick at steel relieving angles as indicated on drawings.

- B. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
  - 1. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
  - 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- C. Face Brick: ASTM C 216, Grade SW, Type FBS, and as follows:
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
  - 2. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
  - 3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
  - 4. Type: Match existing.
  - 5. Size: Modular: 3-5/8" w x 2-1/4" h x 7-5/8" l
  - 6. Colors: Match existing.
  - 7. Texture: Match existing.

## 2.2 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color cement.
  - 1. For pre-cast concrete and brickwork, provide natural color or white cement as required to produce required mortar colors.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
- D. Masonry Cement: Not permitted.
- E. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4 inch (6.5 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
  - 1. For colored mortar, provide natural sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar colors.
- F. Aggregate for Grout: ASTM C 404.
- G. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
- H. Water: Potable.

## 2.3 TIES AND ANCHORS, GENERAL

- A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.
- B. Stainless Steel Wire: ASTM A580/A580M, Type 304.
- C. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
- D. Stainless Steel Bars: ASTM A276 or ASTM A666, Type 304.
- E. Mill Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 641 (ASTM A 641M), Class 1 coating.
- F. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.
- G. Steel Sheet, Galvanized after Fabrication: ASTM A 366/A 366M cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153
- H. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

## 2.4 ADJUSTABLE MASONRY-VENEER ANCHORS

- A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing or insulation to wood or metal studs, and as follows:
  - 1. Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
- B. Screw-Attached, Masonry-Veneer Anchors for Metal Stud Back-up Construction: Units consisting of a wire tie section and a metal anchor section complying with the following requirements:
  - 1. Anchor Section: Rib-stiffened, sheet metal plate with 9/32" diameter screw holes top and bottom; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section.
  - 2. Wire Tie Section: Rectangular- shaped wire tie sized to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face.
  - 3. Fabricate sheet metal anchor sections and other sheet metal parts from 14 gauge (1.9 mm) thick, stainless steel sheet.
  - 4. Fabricate wire tie sections from 3/16 inch- (4.8-mm-) diameter, stainless steel wire.
  - 5. Basis of Design Product: One of the following or equal:
    - a. RJ-711;. Wire-Bond
    - b. HB-213; Hohmann & Barnard, Inc.
    - c. #213 Anchor with #282 Tie; Heckmann Building Products

- C. Stainless-Steel Drill Screws for Steel Studs: Either made from Type 410 stainless steel or made with a carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene washer, No. 10 (4.8-mm) diameter by length required to penetrate steel stud flange by not less than three exposed threads
- D. Expansion Bolt-Attached, Masonry-Veneer Anchors for Existing Masonry or Concrete Back-up Construction (and where dovetail slots have not been installed in concrete): Units consisting of a wire tie section and a metal anchor section complying with the following requirements:
  - 1. Anchor Section: Rib-stiffened, sheet metal plate with 7/16" diameter bolt hole in the center for use with brass expansion bolt; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section.
  - 2. Wire Tie Section: Rectangular- shaped wire tie sized to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face.
  - 3. Fabricate sheet metal anchor sections and other sheet metal parts from 14 gauge (1.9-mm-) thick, stainless steel sheet.
  - 4. Fabricate wire tie sections from 3/16-inch- (4.8-mm-) diameter, stainless steel wire.
  - 5. Basis of Design Product: HB-5213 by Hohmann & Barnard, Inc. or comparable system/product by one of the following:
    - a. Wire-Bond
    - b. Heckmann Building Products (Pos-I-Tie system)
- E. Brass Expansion Bolt for Existing Masonry or Concrete Back-up Construction: Masonry fastener for fastening anchors to concrete, block, brick and into mortar joints complying with the following requirements:
  - 1. Internal Bolt: 1/4" diameter – 20, Type 304 stainless steel.
  - 2. Stainless Steel Washer: 3/4" OD, Type 18-8 stainless steel.
  - 3. Knurled Expansion Sleeve and Expander Cone: Brass 260 alloy.
  - 4. Fixture Clearance Hole: 7/16" diameter
  - 5. ANSI Drill Bit Size: 3/8" diameter
  - 6. Basis of Design Product: 523 Brass Expansion Bolt by Hohmann & Barnard, Inc. or equal system/product by one of the following:
    - a. Wire-Bond
    - b. Heckmann Building Products

## 2.5 RIGID ANCHORS

- A. General: Fabricate from steel bars as follows:
  - 1. 1-1/2 inches (38 mm) wide by 1/4 inch (6.4 mm) thick by 24 inches (600 mm) long, with ends turned up 2 inches (50 mm) or with cross pins.
  - 2. Finish: Hot-dip galvanized to comply with ASTM A 153.

## 2.6 MISCELLANEOUS ANCHORS

- A. Postinstalled Anchors: Anchors as described below, with capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
1. Type: Chemical anchors.
  2. Type: Expansion anchors.
  3. Corrosion Protection (Indoor): Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).
  4. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4) for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.
  5. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
  6. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.

## 2.7 EMBEDDED FLASHING MATERIALS

- A. Concealed Adhered Masonry Flashing: Provide stainless steel fabric laminated sheet flashing overlapping a full bed depth stainless steel drip as follows:
1. Basis of Design Product: Provide specified product of Hohmann & Barnard or equal products by York or Wire-Bond.
  2. Sheet-Metal Drip Flashing: Fabricate from 22 gage stainless steel with the drip edge hemmed approximately 3/16-inch and a 2 inch turn-up, as indicated on Drawings.
  3. Termination Bar: Stainless steel.
  4. Self-Adhering Stainless Steel Fabric Laminated Sheet Flashing: Manufacturer's standard composite membrane consisting of a polymeric film laminated to a .003 inch stainless steel sheet, with a pressure-sensitive, clear adhesive; non-asphaltic; Mighty-Flash – SA Self-Adhering Stainless Steel Fabric Flashing by Hohmann & Barnard or equal. Verify compatibility with air barrier system that sheet flashing contacts.
    - a. Primer: Flashing manufacturer's standard product or product recommended by flashing manufacturer for bonding flashing sheets to masonry and concrete; Primer – SA by Hohmann & Barnard or equal.
- B. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:
1. Stainless Steel: ASTM A 240/A 240M, Type 304, 26 gauge 0.016 inch (0.40 mm) thick.
  2. Fabricate drip edge in one continuous length, 4 inches wide, with a hemmed outer edge condition held flush with face of finished masonry.
- C. Application: Unless otherwise indicated, use the following:
1. Where flashing is indicated to receive counterflashing, use metal flashing.

2. Where flashing is partly exposed and is indicated to terminate at the wall face, use concealed flexible flashing with a metal drip edge.
3. Where flashing is fully concealed, use flexible flashing.

## 2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- C. Wicking Material: Absorbent rope, made from UV-resistant synthetic fiber, 1/4 to 3/8 inch (6 to 10 mm) in diameter, in length required to produce 2-inch (50-mm) exposure on exterior and 18 inches (450 mm) in cavity. Use only for weeps.
  1. Application: At pre-cast concrete trim, and other locations as indicated
- D. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe.
  1. Color: Match mortar color.
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equivalent:
    - a. WeepVent by Mortar Net Solutions.
    - b. CavClear Weep Vents.
    - c. Weep Mesh by Advanced Building Products
  3. Application: At brick veneer.
- E. Cavity Drainage Material: 2-inch- (50-mm-) thick, reticulated, nonabsorbent mesh, made from polyethylene strands with 90% open plastic mesh configuration, and dovetail shape to maintain drainage at weep holes without being clogged by mortar droppings.
  1. Basis of Design Product: Provide one of the following or equivalent:
    - a. Mortar Net by Mortar Net Solutions
    - b. Mortar Trap by Hohmann & Barnard, Inc.
    - c. ProNet by Masonpro
- F. Cavity Drainage Material: 3/4-inch- (50-mm-) thick, reticulated, nonabsorbent mesh, made from polyethylene strands with 90% open plastic mesh configuration.
  1. Use in cavities with masonry back up and with less than 1 1/8" clear cavity only.
  2. Product: Subject to compliance with requirements, provide CavClear Masonry Mat manufactured by CavClear.

## 2.9 MASONRY CLEANERS

- A. Job-Mixed Detergent Solution: Solution of 1/2-cup (0.14-L) dry measure tetrasodium polyphosphate and 1/2-cup (0.14-L) dry measure laundry detergent dissolved in 1 gal. (4 L) of water.
- B. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
  - 1. Products for Cleaning Unit Masonry: Subject to compliance with requirements, provide one of the following:
    - a. Cleaners for Red and Light-Colored Brick Not Subject to Metallic Staining with Mortar Not Subject to Bleaching: Sure Klean No. 600 Detergent; ProSoCo, Inc.
    - b. Cleaners for Red and Dark-Colored Brick Not Subject to Metallic Staining: Sure Klean No. 101 Lime Solvent; ProSoCo., Inc.
    - c. Cleaners for Brick Subject to Metallic Staining: Sure Klean Vana Trol; ProSoCo, Inc.

## 2.10 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
- B. Colored Mortar for Pre-Cast Concrete and Brickwork: Produce mortar of color specified, and to match approved mock-ups by using selected ingredients. Do not alter specified proportions without Architect's approval.
  - 1. Use naturally colored aggregates to produce required mortar color to greatest extent possible, before adding pigments.
  - 2. Pigments: Where mortar pigments are used, do not exceed a pigment-to-cement ratio of 1:10 by weight.
  - 3. Color: Match existing.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.
  - 1. Limit cementitious materials in mortar to portland cement and lime.
  - 2. For masonry below grade, in contact with earth, and where indicated, use Type M.
  - 3. For pre-cast concrete and brick units, use Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 5 of ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.

2. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
  1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
  2. Verify that foundations are within tolerances specified.
  3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

### 3.2 INSTALLATION, GENERAL

- A. For cold-weather construction comply with requirements contained in ACI 530.1-05
- B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual widths of masonry units, using units of widths indicated.
- C. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.
- D. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.
- E. Cut masonry units with motor-driven saws to provide clean, sharp, un-chipped edges. Cut units as required to provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- F. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
  1. Mix units from several pallets or cubes as they are placed.
- G. Wetting of Brick: Wet brick before laying if the initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying

### 3.3 CONSTRUCTION TOLERANCES

- A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:
- B. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4 inch in 20 feet (6 mm in 6 m), nor 1/2 inch (12 mm) maximum.
- C. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), nor 1/2 inch (12 mm) maximum.
- D. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, the following tolerances will apply.
  - 1. Variation from Plumb: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m) or 1/4 inch in 20 feet (6 mm in 6 m) or more.
  - 2. Variation from Level: Do not exceed 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 3/8 inch (9 mm) maximum.
  - 3. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches (3 mm in 900 mm) or one-fourth of nominal joint width, whichever is less.
  - 4. Variation in Plane between Adjacent Surfaces (Lipping): Do not exceed 1/16-inch (1.5-mm) difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.
- E. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm). Do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
- F. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).

### 3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Lay exposed masonry in running bond pattern unless otherwise indicated; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

- E. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay solid brick-size masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
  - 1. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.
- C. Collar Joints in Masonry: Fill the vertical, longitudinal joint between wythes solidly with grout for exterior walls noted, do not fill insulated cavity walls.

### 3.6 CAVITIES

- A. Keep cavities clean of mortar droppings and other materials during construction. Strike joints facing cavities flush.
  - 1. Use wood strips temporarily placed in cavity to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.
- B. Apply air barrier to face of backup to comply with Section 072726 "Fluid-Applied Membrane Air Barriers."

### 3.7 ANCHORING MASONRY TO STRUCTURAL MEMBERS

- A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
  - 1. Provide an open space not less than 1 inch (25 mm) in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
  - 2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
  - 3. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 16 inches (406 mm) o.c. horizontally, with not less than 1 anchor for each 1.77 sq. ft. (0.16 sq. m) of wall area.

### 3.8 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing or solid backup with masonry-veneer anchors to comply with the following requirements:
  - 1. Fasten each anchor section through sheathing to metal wall framing with two metal screw fasteners of type indicated.
  - 2. Fasten each anchor section to CMU or concrete back-up with to expansion bolt anchors
  - 3. Embed tie sections in masonry joints. Provide not less than 2 inches (50 mm) of air space between back of masonry veneer and face of sheathing.
  - 4. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
  - 5. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and 16 inches (406 mm) o.c. horizontally, with not less than 1 anchor for each 1.77 sq. ft. (0.16 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around the perimeter.

### 3.9 CONTROL AND EXPANSION JOINTS

- A. General: Install vertical control and expansion joints at one side of all doorways and at wall locations maximum 25 ft. o.c., and where indicated. Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
- B. Form control joints in concrete masonry with preformed control-joint gaskets designed to fit standard sash block.
- C. Form expansion joints in brick made from clay or shale by building in joint fillers not less than 3/8 inch (10 mm) for installation of sealant and backer rod specified in Division 07 Section "Joint Sealants." Keep joint free and clear of mortar.
- D. Build in horizontal, pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants."
  - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

### 3.10 LINTELS

- A. Install steel lintels where indicated.
- B. Provide minimum bearing of 8 inches (200 mm) at each jamb, unless otherwise indicated.

### 3.11 FLASHING, WEEP HOLES, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

- B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
- C. Install flashing as follows:
  - 1. At masonry-veneer walls, apply flexible flashing over the air barrier to a height of 6" above the top of the cavity drainage material and secure flashing top edge with a termination bar to substrate. Apply sealant to top of termination bar. Install a 6" wide strip of compatible self-adhesive membrane over the installed termination bar and sealant, centered on the termination bar. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge
  - 2. At lintels and shelf angles, extend flashing a minimum of 4 inches (100 mm) into masonry at each end. At heads and sills, extend flashing 4 inches (100 mm) at ends and turn flashing up not less than 2 inches (50 mm) to form a pan.
  - 3. Extend sheet metal flashing 1/2 inch (13 mm) beyond face of masonry at exterior and turn flashing down to form a drip.
  - 4. Install end dams at all window and door flashing locations.
- D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashing and as follows:
  - 1. Use mesh weep vents to form weep holes at brick.
  - 2. Use wicking material to form weep holes above flashing under pre-cast concrete sills. Turn wicking down at lip of sill to be as inconspicuous as possible
  - 3. Space weep holes 24 inches (600 mm) o.c.
  - 4. Place cavity drainage material immediately above flashing in cavities.
- E. Install vents in vertical head joints at the top of each continuous cavity at spacing indicated. Use plastic weep hole/vents to form vents.
- F. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

### 3.12 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
  4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
  5. Clean brick masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

END OF SECTION 042000

## SECTION 055000 - METAL FABRICATIONS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. This Section includes the following:

1. Steel ladder.
2. Handrails and railings at ramps.
3. Handrails attached to walls adjacent to ramps.
4. Guardrails.
5. Support angles for elevator door sills.
6. Lintels

#### 1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal handrails and railings, and guardrails.

B. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding the allowable design working stress of materials for handrails, railings, anchors, and connections:

1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:
  - a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
  - b. Uniform load of 50 lbf/ft. (730 N/m) applied horizontally and concurrently with uniform load of 100 lbf/ft. (1460 N/m) applied vertically downward.
  - c. Concentrated and uniform loads above need not be assumed to act concurrently.
2. Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
  - a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction.
  - b. Uniform load of 50 lbf/ft. (730 N/m) applied in any direction.
  - c. Concentrated and uniform loads above need not be assumed to act concurrently.
3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.

- a. Load above need not be assumed to act concurrently with loads on top rails in determining stress on guards.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For all fabricated products including the following:
  1. Paint products.
  2. Grout.
  3. Nonslip aggregates and nonslip-aggregate surface finishes
  4. Ladders
- B. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
  1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Welding Certificates: Copies of certificates for welding procedures and personnel.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Delegated-Design Submittal: For handrails and railings, and guardrails including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

### 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of metal stairs, platforms, walkways, and handrails and railing systems that are similar to those indicated for this Project in material, design, and extent.
- C. Welding: Qualify procedures and personnel according to the following:
  1. AWS D1.1, "Structural Welding Code--Steel."

2. AWS D1.3, "Structural Welding Code--Sheet Steel."
3. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

D. Mockups: Build mockups of each type of handrail, railing and guardrail system to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Each mock-up shall consist of a typical panel including two posts, top rail, infill area, and anchorage system components that are full height and are not less than 24 inches (600 mm) in length.
2. Notify Architect seven days in advance of dates and times when mock-up will be constructed
3. Remove/dismantle and reprepare mock-up as required to obtain Architect's approval.
4. Approved mock-ups may be incorporated in the finished work.

## 1.6 PROJECT CONDITIONS

A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

## 1.7 COORDINATION

A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

## 1.8 SEQUENCING AND SCHEDULING

A. Sequence and coordinate installation of wall handrails as follows:

1. Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.

# PART 2 - PRODUCTS

## 2.1 METALS, GENERAL

- A. Metal Surfaces, General: For metal fabrications 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.

## 2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating.
- C. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads. For exterior installations and where indicated, provide pipe with hot-dip galvanized coating.
- D. Slotted Channel Framing: Cold-formed metal channels with flange edges returned toward web and with 9/16-inch- (14.3-mm-) wide slotted holes in webs at 2 inches (51 mm) o.c.
1. Width of Channels: 1-5/8 inches (41 mm).
  2. Depth of Channels: As indicated.
  3. Metal and Thickness: Galvanized steel complying with ASTM A 653/A 653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating; 0.108-inch (2.8-mm) nominal thickness.
  4. Finish: Unfinished.
- E. Malleable-Iron Castings: ASTM A 47, Grade 32510 (ASTM A 47M, Grade 22010).
- F. Gray-Iron Castings: ASTM A 48, Class 30 (ASTM A 48M, Class 200), unless another class is indicated or required by structural loads.
- G. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 (ASTM A 47M) malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- H. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

## 2.3 PAINT

- A. Shop Primer for Interior Ferrous Metal: Modified oil-alkyd primer, Tnemec 88-559 or 10-1009, or equivalent. Primer shall be compatible with finish paint specified in Section 099100.
- B. Shop Primer for Galvanized Ferrous Metal: Polyamide epoxy primer, Tnemec F.C. Typoxy Series 27, or equivalent. Primer shall be compatible with finish paint specified in Section 099100.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- D. Shop Primer for Exterior Ferrous Metal: Organic zinc-rich primer, complying with SSPC-Paint 20 and compatible with topcoat; Tnemec-Zinc 90-97; Tnemec Company, Inc.
- E. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.4 FASTENERS

- A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls, except as noted below. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36.
- D. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
- E. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- F. Wood Screws: Flat head, carbon steel, ASME B18.6.1.
- G. Plain Washers: Round, carbon steel, ASME B18.22.1 (ASME B18.22M).
- H. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1 (ASME B18.21.2M).
- I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Material: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

J. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.

## 2.5 GROUT

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

## 2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Shear and punch metals cleanly and accurately. Remove burrs.
- C. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Weld corners and seams continuously to comply with the following:
  1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
- H. Allow for thermal movement resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base

engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

- I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- J. Remove sharp or rough areas on exposed traffic surfaces.
- K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

## 2.7 ROUGH HARDWARE

- A. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 sections.
- B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

## 2.8 HANDRAILS AND RAILINGS AND GUARDRAILS

- A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
- B. Interconnect members by butt-welding or welding with internal connectors, at fabricator's option, unless otherwise indicated.
  1. At tee and cross intersections of pipe and tube, cope ends of intersecting members to fit contour of tube to which end is joined, and weld all around.
- C. Form changes in direction of handrails and rails as detailed.
- D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- E. Close exposed ends of pipe and tube handrail and railing members with prefabricated end fittings.

- F. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting railings and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
  - 1. Connect railing posts to concrete by inserting into preset sleeves, attaching to floor brackets, or core drilling, as indicated.
- H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.
- I. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- J. For railing posts set in concrete, provide steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with steel plate forming bottom closure.
- K. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
- L. Steel Handrail Finishes:
  - 1. Provide hot-dipped galvanized finish for all components of exterior steel handrail and railing system including fittings, brackets, anchors, fasteners, and sleeves.
  - 2. Shop prime and field paint all steel handrails and railings.

## 2.9 STEEL LADDERS

- A. General: Fabricate ladders for locations shown, with dimensions, spacings, details, and anchorages as indicated.
  - 1. For elevator pit ladders, comply with ASME A17.1/CSA B44.
- B. Siderails: Continuous, 1/2-by-2-1/2-inch (12-by-64-mm) steel flat bars, with eased edges, spaced 18 inches (457 mm) apart.
- C. Bar Rungs: 3/4-inch- (19-mm-) diameter steel bars, spaced 12 inches (300 mm) o.c.
- D. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.

- E. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted steel brackets. Size brackets to support design loads specified in ANSI A14.3.
- F. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
- G. Galvanize ladders, including brackets and fasteners.

#### 2.10 LOOSE STEEL LINTELS

- A. Fabricate loose structural-steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Weld adjoining members together to form a single unit where indicated.
- C. Size loose lintels to provide bearing length at each side of openings equal to one-twelfth of clear span, but not less than 8 inches (200 mm), unless otherwise indicated.
- D. Galvanize loose steel lintels located in exterior walls.
- E. Shop prime and field paint all lintels, leave embedded portions of lintels unpainted.

#### 2.11 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

#### 2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
  - 1. ASTM A 123, for galvanizing steel and iron products.
  - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware..
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
  - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

- C. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes indicated as unpainted, and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.
  - 1. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
  - 2. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- E. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

### 3.2 INSTALLING RAILINGS AND HANDRAILS

- A. Adjust handrails and railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and railing ends to building construction as follows:
1. Anchor posts to steel by welding directly to steel supporting members.
  2. Use steel pipe sleeves preset and anchored into concrete for installing posts where indicated. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch (3-mm) buildup, sloped away from post.
  3. Where indicated, core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
  4. Cover anchorage joint of post with flange of same metal as post where indicated.
  5. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.
  6. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.
- B. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as follows:
1. Use type of bracket with predrilled hole for exposed bolt anchorage.
  2. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
  3. For hollow masonry anchorage, use toggle bolts.

### 3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 Section "Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

## **SECTION 061000 - ROUGH CARPENTRY**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Wood blocking and nailers.
4. Wood furring.
5. Wood sleepers.
6. Plywood backing panels.

#### **1.2 ACTION SUBMITTALS**

**A. Product Data:**

1. For each type of process and factory-fabricated product.
2. For preservative-treated wood products.

#### **1.3 INFORMATIONAL SUBMITTALS**

**A. Material Certificates:**

1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

**B. Evaluation Reports: For the following, from ICC-ES:**

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Shear panels.
5. Power-driven fasteners.
6. Post-installed anchors.
7. Metal framing anchors.

## PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content:
  - 1. Boards: 19 percent.
  - 2. Dimension Lumber: 19 percent unless otherwise indicated.
  - 3. Timber: 19 percent.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable design stresses, as published by manufacturer, are to meet or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

### 2.2 PRESERVATIVE TREATMENT

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.

3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

## 2.3 FIRE-RETARDANT-TREATMENT

- A. General: Where fire-retardant-treated materials are indicated, materials are to comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  1. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
  2. Interior Type A: Treated materials are to have a moisture content of 28 percent or less when tested according to ASTM D3201/D3201M at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings.

## 2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions by Grade: Construction, Stud, or No. 3 grade.
  1. Application: Interior partitions not indicated as load bearing.
- B. Framing Other Than Non-Load-Bearing Partitions by Grade: No. 2 grade.
  1. Application: Framing other than interior partitions not indicated as load bearing.

## 2.5 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.
  - 1. Extreme Fiber Stress in Bending, Edgewise: 2800 psi for 12-inch nominal-depth members.
  - 2. Modulus of Elasticity, Edgewise: 2,000,000 psi.
- B. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Comply with material requirements of and with structural capacities established and monitored according to ASTM D5055.
  - 1. Web Material: Either OSB or plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1.
  - 2. Structural Properties: Depths and design values not less than those indicated.
- C. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research or evaluation report for I-joists.
  - 1. Manufacturer: Provide products by same manufacturer as I-joists.
  - 2. Material: All-veneer product, glued-laminated wood or product made from any combination solid lumber, wood strands, and veneers.
  - 3. Thickness: 1-1/4 inches, minimum

## 2.6 MISCELLANEOUS LUMBER

- A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Rooftop equipment bases and support curbs.
  - 4. Cants.
  - 5. Furring.
  - 6. Grounds.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 19 percent maximum moisture content.

## 2.7 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

## 2.8 SUBFLOORING

- A. Plywood or Oriented-Strand-Board subflooring: APA rated,  $\frac{3}{4}$ " thick.

1. Match existing subfloor thickness if different than  $\frac{3}{4}$ " thick.

## 2.9 FASTENERS

- A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

- C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction.

## 2.10 METAL FRAMING ANCHORS

- A. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

- B. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A653/A653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.

1. Use for wood-preservative-treated lumber and where indicated.

## 2.11 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets:

1. Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- D. Install shear wall panels to comply with manufacturer's written instructions.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

END OF SECTION 061000

## **SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Wood blocking, cants, furring, supports, and nailers.
2. Plywood backing panels.
3. Plywood wall sheathing.

#### **1.2 DEFINITIONS**

A. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NELMA - Northeastern Lumber Manufacturers Association.
2. NLGA - National Lumber Grades Authority.
3. SPIB - Southern Pine Inspection Bureau.
4. WCLIB - West Coast Lumber Inspection Bureau.
5. WWPA - Western Wood Products Association.

#### **1.3 ACTION SUBMITTALS**

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.
3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

#### **1.4 INFORMATIONAL SUBMITTALS**

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses.

- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.

## 1.5 QUALITY ASSURANCE

- A. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI).

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings..

# PART 2 - PRODUCTS

## 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
1. Factory mark each piece of lumber with grade stamp of grading agency.
  2. Provide dressed lumber, S4S, unless otherwise indicated.
  3. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38-mm actual) thickness or less, unless otherwise indicated.
- B. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.

## 2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWP U1; Use Category UC2 for interior construction not in contact with ground, and Use Category UC3b for exterior construction not in contact with ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
  2. The use of CCA preservative treated wood is prohibited.

- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
- C. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.

## 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Use treatment that does not promote corrosion of metal fasteners.
  - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
  - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency

## 2.4 MISCELLANEOUS LUMBER

- A. Provide miscellaneous lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
  - 3. Furring.

4. Sleepers
5. Cants

- B. For items of dimension lumber size, provide Construction, Stud, or No. 2 grade lumber with 19 percent maximum moisture content and the following species: Mixed southern pine; SPIB.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content of the following species and grades:
  1. Spruce-pine-fir (south) or Spruce-pine-fir, Construction or 2 Common grade; NELMA, NLGA, WCLIB, or WWPA.

## 2.5 PLYWOOD PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2 inch (12.7 mm) thick.
  1. Paint before mounting of equipment.
- B. Plywood Wall Sheathing: DOC PS 1; Exposure 1, Structural I sheathing; span rating to suit framing in each location and in thickness indicated.
- C. Miscellaneous Concealed Plywood: Exposure 1 sheathing, span rating to suit framing in each location, and thickness as indicated but not less than 1/2 inch (13 mm).
  1. Provide fire-retardant-treated panels for interior locations unless indicated.
  2. Provide preservative-treated panels for exterior locations unless indicated.

## 2.6 MISCELLANEOUS MATERIALS

- A. Fasteners:
  1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
  2. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

## 2.7 ACCESSORY MATERIALS

- A. Weather Resistant Barrier: Asphalt-saturated organic felt, ASTM D 226, Type 1 (No. 15 asphalt felt), unperforated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- C. Apply field treatment complying with AWWPA M4 to cut surfaces of preservative-treated lumber and plywood.
- D. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
- E. Use fasteners of appropriate type and length. Predrill members when necessary to avoid splitting wood.

### 3.2 PANEL PRODUCT INSTALLATION

- A. Fastening Methods: Fasten panels as indicated below:
  - 1. Plywood Backing Panels: Screw to supports.
  - 2. Miscellaneous Concealed Plywood Panels: Screw to supports.
  - 3. Wall Sheathing: Screw to supports.

### 3.3 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

END OF SECTION 061053

## **SECTION 061643 - GYPSUM SHEATHING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Wall sheathing.
2. Sheathing joint and penetration treatment.

**B. Related Requirements:**

1. Division 07 Section "Nonbituminous Self-Adhering Sheet Air and Moisture Barriers" for moisture-resistive barrier applied over wall sheathing.

#### **1.2 ACTION SUBMITTALS**

- A. Product Data:** For each type of product.

#### **1.3 QUALITY ASSURANCE**

- A. Source Limitations:** Obtain each gypsum sheathing product through one source from a single manufacturer.

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.**

#### **1.5 SEQUENCING AND SCHEDULING**

- A. Sequence installing sheathing with installing exterior cladding to comply with requirements indicated below:**
1. Do not leave glass-mat gypsum sheathing board exposed to weather for more than 180 days.

### **PART 2 - PRODUCTS**

#### **2.1 PERFORMANCE REQUIREMENTS**

- A. Fire-Test-Response Characteristics:** For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory," or GA-600, "Fire Resistance Design Manual."

## 2.2 GYPSUM SHEATHING, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated

## 2.3 WALL SHEATHING

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
  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. National Gypsum Company; Gold Bond eXP.
    - b. United States Gypsum Co.; Securock.
    - c. Georgia Pacific; DensGlass
  2. Type and Thickness: Type X, 5/8 inch thick.
  3. Size: 48 by 96 inches or 48 by 120 inches for vertical installation.

## 2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
  1. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

## 2.5 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
  1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.
  2. Sealants and tapes shall be compatible with air and moisture barrier specified in Section 072715. Coordinate with air-barrier selected and provide as required.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with manufacturer's published instructions.
- D. Coordinate wall sheathing installation with air and moisture barrier installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

### 3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
  - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
  - 2. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
  - 3. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
  - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
- D. Seal sheathing joints according to sheathing manufacturer's written instructions.
  - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
  - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 061643

## **SECTION 064020 - INTERIOR ARCHITECTURAL WOODWORK**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Plastic-laminate cabinets and casework.
2. Interior wood trim and rails
3. Cellular PVC ("AZEK") trim

B. Related Work Specified Elsewhere:

1. Solid surface countertops are specified in Division 06 Section "Solid Surface Material Fabrications."

#### **1.2 DEFINITIONS**

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

#### **1.3 SUBMITTALS**

A. Product Data: For each type of product indicated, including cabinet hardware and accessories, and finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.
2. Show locations and sizes of furring, blocking, and hanging strips and clips, cabling and connectors, and attachment devices, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, wire management, and other items installed in architectural woodwork.

C. Samples for Verification: For the following:

1. Lumber with or for transparent finish, 50 sq. in. (300 sq. cm), for each species and cut, finished on 1 side and 1 edge.
2. Plastic-laminate-clad products, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish.
3. Cellular PVC ("AZEK") and trim minimum 6 inches long, for each profile and application used in the work.

- D. Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production and installation of interior architectural woodwork.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.
  - 1. Provide AWI Quality Certification Program certificate indicating that woodwork complies with requirements of grades specified.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

## 1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Low-Emitting Materials: All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI)
- C. Wood Species and Cut for Transparent Finish: Grade A White Birch, flat cut.
  - 1. Matching: Solid stock shall be matched for color and grain; veneer faces shall be compatible in color with solid stock.
  - 2. Veneer Matching: Slip matched and balanced within panel.
- D. Cabinet Interiors (Cabinets with Doors): Plastic laminate with 3 mm PVC edgebanding (kerf and adhesion installation) on shelves.
- E. Wood Products: Comply with the following:
  - 1. Hardboard: Tempered, S1S, Class 1 minimum 1/4 inch and conforming to PS 58-73.
  - 2. Particleboard: Minimum 45 lb. density particleboard complying with requirements in ANSI A208.1, Grade M - 3i.
  - 3. Medium-Density Fiberboard: ANSI A208.2, Grade 130
  - 4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
  - 5. Hardwood Plywood and Face Veneers: HPVA HP-1.
- F. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
  - 1. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semiexposed edges.

- G. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
  - 1. Colors, Patterns and Finishes: As scheduled
  - 2. Basis of Design Products: As scheduled.
  - 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include, but are not limited to, the following:
    - a. Laminart.
    - b. Panolam Industries International, Inc.
    - c. Wilsonart
- H. Adhesive for Bonding Plastic Laminate: Contact cement.
  - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
- I. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Wood Glues: 30 g/L.
  - 2. Contact Adhesive: 80 g/L.
- J. Cellular PVC Trim: Provide in styles and profiles as indicated on drawings and as required, with smooth surface both sides.
  - 1. Basis of Design Products: Provide AZEK Beadboard and Trim manufactured by AZEK Building Products, or equal.

## 2.2 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware."
- B. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
  - 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
  - 2. Other specific finishes are scheduled on Drawings
- C. Bumpers: Clear pressure sensitive non-skid vinyl bumpers 1/2 inch diameter by 5/32 inches thick; Grass #GF-BP-C, or equivalent.
- D. Frameless Concealed Hinges (European Type): 180 degrees of opening, self-closing, three-way adjustable; Grass #GF-1200VX-8, or equivalent.

- E. Catches: Magnetic catches, 5 lb. holding power; Ives 324-P69, or equivalent. Provide 1 top mounted at each door.
- F. Pulls: As selected by Architect..
- G. Wire Management Grommets: Plastic grommets with cut-out covers cap, 1-1/2 inch I.D. unless otherwise indicated; Hughes Plastic Parts, or equivalent. Color as selected by Architect from manufacturer's standard colors.
- H. Drawer Slides: 3/4 extension type, constructed from zinc plated cold-rolled steel, with ball-bearing rollers, 75 lbf (330 N) load rated; Accuride 214 Series, or equivalent.
- I. Slides for File Drawers: Full extension type, constructed from zinc plated cold-rolled steel, with ball-bearing rollers, 200 lbf (890 N) load rated; Accuride 4437 Series, or equivalent.
- J. Pencil Drawer Slides: 45 lbf (200 N), Accuride 214 Series, or equivalent
- K. Adjustable Shelf Supports: Peg type, steel, 5/16" stem length, 1/4" bore, spoon width 25/64"; Progressive IF-739NP, or equivalent.
- L. Locks: Door locks - NL-C8173-26D; drawer locks - NL-C8178-26D; strike - NL-C2004-14A; National Cabinet Lock, or equivalent. Keyed as requested by Owner.
- M. Levelers: Plastic leveling system, including socket, leveler, toe kick clip, and toe kick handle; Camar model CM-835-E1-00, CM-345-10-P2, CM-202-V1-T2, and CM-230-01-DE, or equivalent.

## 2.3 ACCESSORIES

- A. Shelving: 3/4" thick with 3 mm PVC kerfed edges, unless otherwise indicated.
  - 1. Provide MDO plywood for painted shelving.
  - 2. Provide plastic laminate faced panel product where scheduled or indicated on drawings.
- B. Adjustable Shelf Supports: Decorative, heavy-duty double-slotted standards adjustable on 1-1/4" centers with decorative brackets in length indicated on drawings. Include all accessories including cover strips, end caps, joiners, spacers and fasteners, as required for complete installation. Provide with epoxy finish in color as selected by Architect from manufacturer's standards.
  - 1. Product: Knap & Vogt #82 standards and #182 brackets, or equivalent.

## 2.4 INSTALLATION MATERIALS

- A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- B. Adhesives and Sealants for Cellular PVC Units: Type recommended by manufacturer for applications indicated.

## 2.5 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide Premium grade interior woodwork complying with the referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
  - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch (1.5 mm)
- D. Complete fabrication, including assembly, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- F. Cellular PVC Products: Comply with manufacturer's directions for fabrication, routing and assembly of components.

## 2.6 INTERIOR WOOD TRIM AND RAILS

- A. Quality Standard: Comply with AWI Section 6.
- B. Grade:

1. Premium, for transparent finish items.

- C. For trim items wider than available lumber, use veneered construction. Do not glue for width.
- D. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work
- E. Assemble casings in plant except where limitations of access to place of installation require field assembly.
- F. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

## 2.7 PLASTIC-LAMINATE CABINETS AND CASEWORK

- A. Quality Standard: Comply with AWI Section 10 requirements for custom laminate cabinets.
- B. Grade: Premium
- C. AWI Type of Cabinet Construction: Full overlay.
- D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
  - 1. Horizontal Surfaces Other Than Tops: HGS.
  - 2. Postformed Surfaces: HGP.
  - 3. Vertical Surfaces: HGS.
  - 4. Edges: HGS
- E. Materials for Semiexposed Surfaces Other Than Drawer Bodies:
  - 1. Drawer Sides and Backs: Thermoset decorative overlay.
  - 2. Drawer Bottoms: Thermoset decorative overlay.
- F. Colors, Patterns, and Finishes: As scheduled.
- G. Substrate: Plywood.
- H. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

## 2.8 SHOP FINISH

- A. Quality Standard: Comply with AWI Section 5, unless otherwise indicated.

1. Grade: Provide finishes of same grades as items to be finished.

B. General:

1. Finish all transparent finished architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative overlay.

D. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining, and sheen, with sheen measured on 60-degree gloss meter per ASTM D 523:

1. AWI Finish System 9: UV Curable, Acrylated Epoxy, Polyester or Urethane.
2. Staining: As selected by Architect.
3. Wash Coat for Stained Finish: Apply a vinyl wash coat to woodwork made from closed-grain wood before staining and finishing.
4. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
5. Sheen: Satin.
6. Scope: All transparent finished architectural woodwork.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

### 3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Sections cited for fabrication and in the same grade, as specified in Part 2 of this Section for type of woodwork involved

- B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- E. Wood Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 36 inches (900 mm) long, except where shorter single-length pieces are necessary.
  - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base, if finished.
  - 2. Install trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
  - 2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- G. Cellular PVC Products: Comply with manufacturer's directions for installation methods. Glue and mechanically fasten to substrate along unit's entire length to minimize expansion and contraction. Glue joints.
- H. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in shop.

### 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064020

## **SECTION 066116 - SOLID SURFACE MATERIAL FABRICATIONS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes solid surface material fabricated into the following:
  - 1. Solid surface material countertops
  - 2. Solid surface material thresholds.
  - 3. Solid surface shower surrounds.
- B. Related Sections include the following:
  - 1. Blocking and grounds and substrates for sills are specified in Division 06 Section "Miscellaneous Carpentry".
  - 2. Sealants are specified in Division 07 Section "Sealants."
  - 3. Cement board backer for wall panels is specified in Division 09 Section "Gypsum Board."

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: Indicate product description, fabrication information, and compliance with specified performance requirements.
- B. Shop Drawings: Indicate dimensions, component sizes, fabrication details, attachment provisions, cutouts, and coordination requirements with adjacent work.
- C. Samples: Submit minimum 6" x 6" samples of selected colors and patterns. Where color is not specified, provide full range of manufacturer's available color samples for selection by Architect.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Maintenance Data: Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in project closeout documents.
- B. Fabricator's Certificate: Submit certificate from manufacturer stating that fabricator is certified by manufacturer for this work.

#### **1.4 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Firm experienced and authorized by manufacturer for production of solid surface fabrications similar to that indicated for this Project and with

a record of successful in-service performance, as well as sufficient production capacity to produce required units without delaying the Work.

- B. Fire-Test-Response Characteristics: Provide materials with surface-burning characteristics as indicated below, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Flame Spread: 25 or less.
  - 2. Smoke Developed: 450 or less

## 1.5 JOB CONDITIONS

- A. Do not deliver components to project site until areas are ready for installation. Store indoors.
- B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.
- C. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of work. However, allow for adjustments where taking of field measurements before fabrication might delay work.
- D. Coordination: Furnish inserts and anchorages which must be built into other work. Coordinate delivery with other work to avoid delay.

## 1.6 WARRANTY

- A. General: The special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Warranty. The manufacturer warrants to the original purchaser for commercial use that the manufacturer will at its option repair or replace, without charge, such product if it fails due to a manufacturing defect during the first 10 years after initial installation.

## PART 2 - PRODUCTS

- A. Basis of Design Manufacturers: Provide Basis of Design Products or equal product of one of the following:
  - 1. AristechAcrylics, LLC.
  - 2. DuPont Polymers
  - 3. Wilsonart
  - 4. Swan Corp.

5. Tower Industries

2.2 SOLID SURFACE MATERIALS

- A. General: Provide materials which have been selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections on finished units are not acceptable.
- B. Solid Surface Countertop and Threshold Material (SS-1 - SS-4 and TS-1): Homogeneous solid sheets of filled plastic resin complying with ICPA SS-1.
  - 1. Thickness: 12 mm (1/2").
  - 2. Color(s) and Pattern(s): As scheduled.
  - 3. Finish: Semigloss.
  - 4. Basis of Design Product: Corian Solid Surface by DuPont Polymers, or equal.
- C. Solid Surface Shower Walls Material: Homogeneous solid sheets of filled plastic resin complying with ICPA SS-1.
  - 1. Thickness: 6mm (1/4").
  - 2. Panel Sizes: As indicated on Drawings.
  - 3. Color and Pattern: As selected by Architect for each location.
  - 4. Finish: Matte.
  - 5. Surface Texture: Smooth
  - 6. Basis of Design Product: Meridian Solid Surface Model MSP 140000 by Tower Industries, Inc., or equal.

2.3 MISCELLANEOUS MATERIALS

- A. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, non-porous joints with chemical bonding.
- B. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.
- C. Countertop Support: Rakks EH Surface Mount Bracket RAKKS #EH1818 or equal.
  - 1. Finish: As selected by Architect.

2.4 FABRICATION

- A. General: All fabrications shall be made using solid surface material. Fabrications shall be adhesively jointed with no exposed seams and having edge details as indicated on drawings. No exposed fasteners shall be allowed.

- B. Factory fabricate components into single unit to sizes and shapes indicated, in accordance with approved shop drawings.
- C. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
- D. Provide factory cutouts for bowls, plumbing fittings and accessories as indicated on the drawings.
- E. Cut and finish component edges with clean, sharp returns. Route radii and contours to template. Repair or reject defective and inaccurate work.
- F. Countertops: Fabricate tops in one piece. Comply with solid surfacing material manufacturer's recommendations for adhesives, sealers, fabrication, and finishing. Provide countertops with backsplash, endsplashes, aprons and nosings as shown.
  - 1. Total top thickness shall be as indicated on the Drawings. Provide built-up fabrication as required to obtain required total thickness.
  - 2. Edges: Provide built-up edge 1-1/2" thick with profile as selected by Architect.
- G. Thresholds: Fabricate to sizes and profiles indicated or required to provide transition between adjoining finished floor surfaces. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch or less, and finish bevel to match face of threshold.
- H. Shower Walls: Fabricate each wall surface from a single piece of solid surface material. Form panel edges with tongue and groove interlock or square edges per manufacturer's standard method. Comply with solid surfacing material manufacturer's recommendations for adhesives, sealers, fabrication, and finishing. Provide exposed edges with edge profile as per approved shop drawings. Provide all trims and sealants required for a complete, watertight shower wall installation.
- I. Allowable Tolerances
  - 1. Variation in component size:  $\pm 1/8"$ .
  - 2. Location of openings:  $\pm 1/8"$  from indicated location.

## PART 3 - EXECUTION

### 3.1 INSPECTION

- A. Examine surface to receive work and conditions under which work will be installed. Do not proceed with work until all unsatisfactory conditions are corrected.

### 3.2 INSTALLATION

- A. Install components plumb and level, scribed to adjacent finishes, in accordance with approved shop drawings and product installation data.
- B. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work. Keep components and hands clean when making joints.
- C. Shower Wall: Install in compliance with manufacturer's recommendations to provide a complete, watertight shower wall installation.

### 3.3 ADJUST AND CLEAN

- A. Clean exposed surfaces using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period. Repair work or replace damaged work that cannot be repaired as required.
- B. Keep components and hands clean during installation. Remove adhesives, sealants, and other stains. Replace stained components.

END OF SECTION 066116

## **SECTION 071416 - COLD FLUID-APPLIED WATERPROOFING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Single-component polyurethane waterproofing for vertical applications at below-grade walls at new ramps.

#### **1.2 SUBMITTALS**

- A. Product Data:** For each type of product indicated. Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. Shop Drawings:** Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- C. Qualification Data:** For Installer.
- D. Product Test Reports:** For waterproofing, based on evaluation of comprehensive tests performed by a qualified testing agency.

#### **1.3 QUALITY ASSURANCE**

- A. Installer Qualifications:** A firm that is acceptable to waterproofing manufacturer for installation of waterproofing required for this Project.
- B. Source Limitations:** Obtain waterproofing materials from single source from single manufacturer.

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver liquid materials to Project site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, shelf life, and directions for storing and mixing with other components.**
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.**
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.**
- D. Protect stored materials from direct sunlight.**

## 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than 5 deg F (3 deg C) above dew point.
  - 1. Do not apply waterproofing in snow, rain, fog or mist, or when such weather conditions are imminent during application and curing period.
- B. Maintain adequate ventilation during application and curing of waterproofing materials

## PART 2 - PRODUCTS

### 2.1 SINGLE-COMPONENT POLYURETHANE WATERPROOFING FOR VERTICAL APPLICATIONS

- A. Single-Component, Modified Polyurethane Waterproofing: Comply with manufacturer's written physical requirements and ASTM C836, coal-tar free product.
  - 1. Basis of Design Product: Provide Carlisle Coatings & Waterproofing Inc.; MiraSEAL, or one of the following:
    - a. Mapei; Planiseal CR1
    - b. Tremco; TREMproof® 250GC

### 2.2 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials recommended by manufacturer to be compatible with one another and with waterproofing, as demonstrated by waterproofing manufacturer, based on testing and field experience.
- B. Primer: Manufacturer's standard, factory-formulated polyurethane or epoxy primer.
- C. Sealant: Non-sag polyurethane sealant, acceptable to waterproofing manufacturer.
- D. Bondbreaker Tape: Type acceptable to waterproofing manufacturer.

### 2.3 DRAINAGE PROTECTION BOARD

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft.

1. Basis of Design Product: Provide Carlisle Coatings & Waterproofing Inc.; CCW Miradrain 6200, or one of the following:
  - a. Mapei; Mapedrain 25
  - b. Tremco; TREMDrain 1000 .
- B. Provide adhesives to hold in place as required.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
  1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
  2. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
  3. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 SURFACE PREPARATION

- A. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust-free, and dry substrate for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.

### 3.3 PREPARATION AT TERMINATIONS AND PENETRATIONS

- A. Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to ASTM C 1471 and manufacturer's written instructions.
- B. Prime substrate unless otherwise instructed by waterproofing manufacturer.
- C. Apply waterproofing in two separate applications, using techniques and application tools recommended by waterproofing manufacturer.
  1. Provide sealant cants around penetrations and at inside corners of deck-to-wall butt joints when recommended by waterproofing manufacturer.

### 3.4 JOINT AND CRACK TREATMENT

- A. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1471 and waterproofing manufacturer's written instructions. Remove dust and dirt from joints and cracks, complying with ASTM D 4258, before coating surfaces.
  - 1. Comply with ASTM C 1193 for joint-sealant installation.
  - 2. Apply bond breaker between installed sealant in expansion joints and preparation stripe coat.
  - 3. Apply a single thickness of waterproofing material 4" - 6" wide as a preparation stripe coat over joints and cracks as per manufacturer's recommendations. Apply to thickness recommended by manufacturer. Allow stripe coat to cure.

### 3.5 WATERPROOFING APPLICATION

- A. Apply waterproofing according to ASTM C 1471 and manufacturer's written instructions.
- B. Apply primer over prepared substrate.
- C. Unreinforced Waterproofing Applications: Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate and surface condition of substrate.
  - 1. Apply one or more coats of waterproofing to obtain a seamless membrane free of entrapped gases, with an average dry film thickness of 60 mils (1.5 mm) and a minimum dry film thickness of 50 mils (1.3 mm) at any point
  - 2. Apply waterproofing to prepared wall terminations and vertical surfaces.
  - 3. Verify wet film thickness of waterproofing every 100 sq. ft. (9.3 sq. m).
- D. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.

### 3.6 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels with geotextile facing away from wall surface, according to manufacturer's written instructions over installed waterproofing membrane. Use adhesives that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels by installing protection course of rigid insulation over drainage panel, as indicated on Drawings.

### 3.7 CURING, PROTECTION, AND CLEANING

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Protect installed drainage panels from damage due to ultraviolet light, harmful weather exposures, physical abuse, and other causes. Immediately after installation, provide

temporary coverings where panels will be subject to abuse and cannot be concealed and protected by permanent construction.

- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071416

## **SECTION 072100 - THERMAL INSULATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Mineral-wool blanket insulation.
2. Spray foam insulation

#### **1.2 ACTION SUBMITTALS**

- A. Product Data:** For each type of product indicated.

#### **1.3 QUALITY ASSURANCE**

- A. Surface-Burning Characteristics:** As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.**

### **PART 2 - PRODUCTS**

#### **2.1 MINERAL-WOOL BLANKET INSULATION**

- A. Unfaced, Mineral-Wool Blanket Insulation:** ASTM C 665, Type 1 (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. **Basis of Design Product:** Provide Thermafiber UltraBatt by Owens Corning or equal product by one of the following:
  - a. Rockwool
  - b. Johns Manville
2. **Thickness:** As indicated on Drawings for each application
3. **Application:** Provide for concealed building insulation in exterior stud walls, and elsewhere indicated on drawings.

## 2.2 SPRAY FOAM INSULATION

- A. Spray Can-Type Polyurethane Foam Sealant: Minimal-expanding, single-component polyurethane foam sealant packaged in a spray can and intended to be used to fill smaller cracks and gaps as perimeter seal.

- 1. Basis of Design Product: Great Stuff Window and Door by DuPont, or equal.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

### 3.2 INSTALLATION OF INSULATION FOR FRAMED AND FURRED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
  - 4. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs. Install with required number of fasteners in accordance with manufacturer's recommendations.

- C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

- D. Unfaced mineral wool insulation.

### 3.3 INSTALLATION OF SPRAY FOAM INSULATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.

### 3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

## **SECTION 072715 - NONBITUMINOUS SELF-ADHERING SHEET AIR AND MOISTURE BARRIERS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes: Self-adhering air and moisture barrier.

1. Vapor-permeable nonbituminous sheet.

#### **1.2 DEFINITIONS**

- A. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- B. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.
- C. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

#### **1.3 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.
1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: Self-adhering air barrier. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; and tested physical and performance properties of products.
- B. Shop Drawings: For air-barrier assemblies.
1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions.
  2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

3. Include details of interfaces with other materials that form part of air barrier.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with air barrier.
- C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

## 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
  1. Protect substrates from environmental conditions that affect air-barrier performance.
  2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

# PART 2 - PRODUCTS

## 2.1 SOURCE LIMITATIONS

- A. Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction to be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed roofing membrane, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

## 2.3 NONBITUMINOUS SHEET AIR AND MOISTURE BARRIER

- A. Vapor-Permeable Nonbituminous Sheet: Minimum 15-mil-thick, self-adhering sheet consisting of a breathable carrier film or fabric and an adhesive with release liner on adhesive side.
1. Basis of Design Product: 3M Vapor Permeable Air Barrier 3015VP, or equal.
  2. Physical and Performance Properties:
    - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E2178.
    - b. Nail Sealability: 127mm (5 inches) water head after 3 days Dry / Pass ASTM D1970-14, Section 7.9
    - c. Water Vapor Transmission: Minimum Dry Cup 12 perms and Wet Cup 17 perms; ASTM E96/E96M
    - d. Lap Adhesion to Substrate: Minimum 50 oz./inch; ASTM D3330.
    - e. Tensile Strength: 1177 psi; ASTM D882
    - f. Elongation at Break: 40%; ASTM D882
    - g. UV Resistance: Can be exposed to sunlight for up to 12 months in accordance with manufacturer's written instructions.

## 2.4 ACCESSORY MATERIALS

- A. Requirement: Provide primers, transition strips, termination strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Self-Adhering Transition Membrane: Provide the following:
1. At Window Opening Corners: Ultra-conforming flashing tape; 3M 3015 UC or equal.
  2. At all Transitions in Plane (including membrane wrapping into window and door openings and membrane sealing over metal edge flashing at window heads): 3M Through Wall Flashing Tape 3015TWF, or equal.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
  - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
  - 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
  - 3. Verify that substrates are visibly dry and free of moisture
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate in accordance with manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- D. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- E. Bridge expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement in accordance with manufacturer's written instructions and details.

### 3.3 INSTALLATION OF NONBITUMINOUS SHEET AIR BARRIER

- A. Install materials in accordance with air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
- B. Prepare, treat, and seal inside and outside corners and vertical and horizontal surfaces at terminations and penetrations with termination mastic.
- C. Apply and firmly adhere air-barrier sheets over area to receive air barrier. Accurately align sheets and maintain uniform 2-inch-minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure airtight installation.

1. Apply sheets in a shingled manner to shed water.
  2. Roll sheets firmly to enhance adhesion to substrate.
- D. Apply continuous air-barrier sheets over accessory strips bridging substrate cracks, construction, and contraction joints.
- E. Seal exposed edges of sheet at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- F. Install air-barrier sheet and accessory materials to form a seal with adjacent construction and to maintain a continuous air barrier.
1. Coordinate air-barrier installation with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
  2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
- G. Connect and seal exterior wall air-barrier sheet continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- H. At end of each working day, seal top edge of air-barrier material to substrate with termination mastic.
- I. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- J. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
1. Transition Strip: Roll firmly to enhance adhesion.
- K. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- L. Repair punctures, voids, and deficient lapped seams in air barrier. Slit and flatten fishmouths and blisters. Patch with air-barrier sheet extending 6 inches beyond repaired areas in all directions.
- M. Do not cover air barrier until it has been tested and inspected by testing agency.
- N. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

### 3.4 FIELD QUALITY CONTROL

- A. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
  2. Continuous structural support of air-barrier system has been provided.
  3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
  4. Site conditions for application temperature and dryness of substrates have been maintained.
  5. Maximum exposure time of materials to UV deterioration has not been exceeded.
  6. Surfaces have been primed.
  7. Laps in sheet materials have complied with the minimum requirements and have been shingled in the correct direction (or mastic applied on exposed edges), with no fishmouths.
  8. Termination mastic has been applied on cut edges.
  9. Air barrier has been firmly adhered to substrate.
  10. Compatible materials have been used.
  11. Transitions at changes in direction and structural support at gaps have been provided.
  12. Connections between assemblies (air barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
  13. All penetrations have been sealed.
- B. Air barriers will be considered defective if they do not pass tests and inspections.
1. Apply additional air-barrier material, in accordance with manufacturer's written instructions, where inspection results indicate insufficient thickness.
- C. Prepare inspection reports.

### 3.5 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, in accordance with manufacturer's written instructions.
1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials in accordance with air-barrier manufacturer's written instructions.
  2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

- B. Clean spills, stains, and soiling from construction that would be exposed in the completed Work, using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 072715

## **SECTION 078413 - PENETRATION FIRESTOPPING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in fire-resistance-rated horizontal assemblies.
3. Penetrations in non-fire-resistance-rated horizontal assemblies.
4. Penetrations in smoke barriers, smoke partitions and smoke tight partitions.

**B. Related Sections:**

1. Section 078446 "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction and in smoke barriers.

#### **1.2 ACTION SUBMITTALS**

**A. Product Data:** For each type of product indicated.

**B. Product Schedule:** For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

#### **1.3 INFORMATIONAL SUBMITTALS**

**A. Qualification Data:** For qualified Installer.

**B. Installer Certificates:** From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

**C. Product Test Reports:** Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

#### **1.4 QUALITY ASSURANCE**

**A. Installer Qualifications:** A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include

having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
  - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
  - b. Classification markings on penetration firestopping correspond to designations listed by the following:
    - 1) UL in its "Fire Resistance Directory."
    - 2) Intertek ETL SEMKO in its "Directory of Listed Building Products."
    - 3) FM Global in its "Building Materials Approval Guide."

C. Preinstallation Conference: Conduct conference at Project site.

## 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

## 1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
- C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

## 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. Penetration Firestop Systems specified in the Schedule in Part - 3 include:
    - a. Fire Barrier Products, 3M Fire Protection Products
    - b. RectorSeal Corporation.
  2. Subject to compliance with specified requirements, provide Penetration Firestop Systems (XHEZ) listed in Volume II of the UL Fire Resistance Directory (BXRH), by one of the following:
    - a. Hilti, Inc.
    - b. Nelson Firestop Products.
    - c. RectorSeal Corporation.
    - d. Specified Technologies Inc.
    - e. 3M Fire Protection Products.
    - f. Wiremold/Legrand

## 2.2 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions.
  2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. Horizontal assemblies include floors and floor/ceiling assemblies.
  2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
  3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at 0.30-inch wg (74.7 Pa) at both ambient and elevated temperatures.

- E. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
- F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
  - 1. Permanent forming/damming/backing materials, including the following:
    - a. Slag-wool-fiber or rock-wool-fiber insulation.
    - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    - c. Fire-rated form board.
    - d. Fillers for sealants.
  - 2. Temporary forming materials.
  - 3. Substrate primers.
  - 4. Collars.
  - 5. Steel sleeves.

## 2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
  - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

## 2.4 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, 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: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.

- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

### 3.3 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Designation of applicable testing and inspecting agency.
  - 4. Date of installation.
  - 5. Manufacturer's name.
  - 6. Installer's name.

### 3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
- C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

### 3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

### 3.7 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. For penetrations in non-fire rated horizontal assemblies, smoke barriers, smoke partitions and smoke tight partitions, provide systems tested for 1 hour unless otherwise noted.
- C. Basis of Design Assemblies: Subject to compliance with requirements, provide the design indicated below or a comparable UL design by one of manufacturer's listed in Part 2 above.
  - 1. Schedule of construction components, type of penetrant, and U.L. Penetration Firestop Systems include, but are not limited to the following:
  - 2. Schedule of construction components, type of penetrant, and U.L. Penetration Firestop Systems include, but are not limited to the following:

	P E N E T R A N T						
	Metal Conduit	Cable Tray <sup>4</sup>	Cables	Non-Insul. Metal Pipe	Insul. Pipe	FR Polypropylene Pipe	Insul. Metal Duct

	<b>P E N E T R A N T</b>						
	<b>Metal Conduit</b>	<b>Cable Tray<sup>4</sup></b>	<b>Cables</b>	<b>Non-Insul. Metal Pipe</b>	<b>Insul. Pipe</b>	<b>FR Polypropylene Pipe</b>	<b>Insul. Metal Duct</b>
<b>GWB Stud Wall, or Shaft Wall up to 2 Hr Rating</b>	W-L-1001	W-L-4004	W-L-3001	W-L-1001	W-L-5011	W-L-2002	W-L-7006 <sup>3</sup>
<b>CMU Wall up to 2 Hr Rating</b>	C-AJ-1044	C-AJ-4003	C-AJ-3030	C-AJ-1044	C-AJ-5001	C-AJ-2001	C-AJ-7003 <sup>3</sup> , 7016 <sup>3</sup>
<b>Concrete Floor / Metal Deck 1 Hr Rated F and T-Rating<sup>2</sup></b>	C-AJ-1008	N/A	C-AJ-3029	C-AJ-1008	C-AJ-5002	F-A-2002	C-AJ-7009 <sup>5</sup>
<b>Concrete Floor / Metal Deck 2 Hr Rated F and T-Rating<sup>2</sup></b>	C-AJ-1008	N/A	C-AJ-3029	C-AJ-1008	C-AJ-5060	F-A-2002	N/A
<b>Concrete Floor / Metal Deck up to 2 Hr F Rated<sup>1</sup></b>	F-A-1002	N/A	C-AJ-3030	C-AJ-1044	C-AJ-5001	F-A-2002	N/A

#### KEY TO NOTES

1. Penetration within wall cavity.
2. Penetration that does not fall within wall cavity, T-Rating required.
3. Up to 1 hour rating, submit engineered judgement firestopping system for this combination of penetrant, wall/floor assembly, and fire rating. Install fire dampers in 2-hour walls in accordance with manufacturer's instructions and testing agency requirements.
4. Where cable tray extends through wall.
5. For floor penetrations not enclosed above and below the floor with shaft wall.

D. Membrane Penetrations:

1. Firestop membrane penetrations by cables, pipes and conduit similar to through wall penetrations.
2. Provide putty pad box wrap firestopping for membrane penetrations in rated walls for electrical back boxes over 16 sq. inches, where any back boxes are located within 24 inches horizontal of another back box, or when total area of back boxes exceeds 100 sq in. in 100 sq. ft. of wall area.

- E. Where another type of construction or penetrant is encountered, or if field conditions vary from those described in the U.L. System listed (i.e. annular space is greater/smaller, insulation type varies, etc.), provide firestopping systems which are appropriate, and U.L. tested, for that condition.

END OF SECTION 078413

## **SECTION 078446 - FIRE-RESISTIVE JOINT SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Joints in or between fire-resistance-rated constructions.
2. Joints in smoke barriers.

**B. Related Sections:**

1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

#### **1.2 ACTION SUBMITTALS**

**A. Product Data:** For each type of product indicated.

**B. Product Schedule:** For each fire-resistive joint system. Include location and design designation of qualified testing agency.

1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

#### **1.3 INFORMATIONAL SUBMITTALS**

**A. Qualification Data:** For qualified Installer.

**B. Installer Certificates:** From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

**C. Product Test Reports:** Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

#### **1.4 QUALITY ASSURANCE**

**A. Installer Qualifications:** A firm experienced in installing fire-resistive joint systems similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its fire-resistive joint

system products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

- B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:
  - 1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:
    - a. Fire-resistive joint system products bear classification marking of qualified testing agency.
    - b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:
      - 1) UL in its "Fire Resistance Directory."

- C. Preinstallation Conference: Conduct conference at Project site.

## 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

## 1.6 COORDINATION

- A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate fire-resistive joint systems.
- C. Notify Owner's testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on day preceding each series of installations.

## PART 2 - PRODUCTS

### 2.1 FIRE-RESISTIVE JOINT SYSTEMS

- A. Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall

accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

- B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:
1. Joints include those installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
  2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
  3. 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. Grace Construction Products.
    - b. Hilti, Inc.
    - c. RectorSeal Corporation.
    - d. Specified Technologies Inc.
    - e. 3M Fire Protection Products.
    - f. Tremco, Inc.; Tremco Fire Protection Systems Group.
- C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079.
1. L-Rating: Not exceeding 5.0 cfm/ft (0.00775 cu. m/s x m) of joint at 0.30 inch wg (74.7 Pa) at both ambient and elevated temperatures.
  2. 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. Grace Construction Products.
    - b. Hilti, Inc.
    - c. Johns Manville.
    - d. RectorSeal Corporation.
    - e. Specified Technologies Inc.
    - f. 3M Fire Protection Products.
    - g. Tremco, Inc.; Tremco Fire Protection Systems Group.
- D. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, 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: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
  - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
  - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

### 3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
  - 2. Apply fill materials so they contact and adhere to substrates formed by joints.
  - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION

- A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Designation of applicable testing agency.
  - 4. Date of installation.
  - 5. Manufacturer's name.
  - 6. Installer's name.

### 3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.
- C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

### 3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

### 3.7 FIRE-RESISTIVE JOINT SYSTEM / FIRESTOP JOINT SYSTEM SCHEDULE

- A. Where UL-classified firestop joint systems are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHBN.

<b>Firestop Joint System Location</b>	<b>Basis-of-Design</b>	<b>Assembly Rating</b>	<b>Nominal Joint Width</b>	<b>Movement Capabilities <sup>2</sup></b>
<b>Floor-to-Wall</b>				
Rated concrete masonry wall construction intersection with adjacent floor construction	FW-D-1012, FW-D-1013	1 hour or 2 hours <sup>1</sup>	As indicated, or required by tested assembly	Class II
<b>Head-of-Wall</b>				
Rated gypsum wall construction intersection with steel floor deck above	HW-D-0087, or HW-D-0089	1 hour or 2 hours <sup>1</sup>	As indicated, or required by tested assembly	Class II or III,
Rated gypsum wall construction intersection with concrete floor deck above	HW-D-0083, HW-D-209	1 hour or 2 hours <sup>1</sup>	As indicated, or required by tested assembly	Class II
Rated concrete masonry wall construction intersection with steel floor deck above	HW-D-0081, or HW-D-0098	1 hour or 2 hours <sup>1</sup>	As indicated, or required by tested assembly	Class II
Rated concrete masonry wall construction intersection with concrete floor deck above	HW-D-0268, HW-D-0097	1 hour or 2 hours <sup>1</sup>	As indicated, or required by tested assembly	Class II
<b>Bottom-of-Wall</b>				
Rated gypsum wall construction intersection with concrete floor	BW-S-0002	1 hour or 2 hours <sup>1</sup>	As indicated, or required by tested assembly	Static

1. Rating to match wall construction.

2. Class UL2079

- B. Where another type of construction is encountered, or if field conditions vary from those described in the U.L. System listed (i.e. annular space is greater/smaller, insulation type varies, etc.), provide firestopping systems which are appropriate, and U.L. tested, for that condition.

END OF SECTION 078446

ATTACHMENT: FIRESTOP JOINT SYSTEMS SUBMITTAL SHEET

### 3.8 FIRESTOP JOINT SYSTEMS SUBMITTAL SHEET

- A. **HEAD-OF-WALL FIRESTOPPING:** Fill in the U.L. Design number and attach copy of U.L. Test. Insert n/a if condition is not applicable.

1. Gypsum wall construction intersection with floor deck above: \_\_\_\_\_.  
Gypsum wall construction intersection with roof deck above: \_\_\_\_\_.
2. Concrete masonry wall construction intersection with floor deck above: \_\_\_\_\_.
3. Concrete masonry wall construction intersection with roof deck above: \_\_\_\_\_.

- B. **FLOOR-TO-WALL FIRESTOPPING:** Fill in the U.L. Design number and attach copy of U.L. Test. Insert n/a if condition is not applicable.

1. Concrete masonry wall construction intersection with adjacent floor construction: \_\_\_\_\_.

- C. **BOTTOM-OF-WALL FIRESTOPPING:** Fill in the U.L. Design number and attach copy of U.L. Test. Insert n/a if condition is not applicable.

1. Gypsum wall construction intersection with floor deck: \_\_\_\_\_. Gypsum wall construction intersection with roof deck above: \_\_\_\_\_.
2. Concrete masonry wall construction intersection with floor \_\_\_\_\_.
3. Concrete masonry wall construction intersection with roof deck above: \_\_\_\_\_.

- D. **CURTAIN WALL FIRESTOPPING:** Fill in the design number and copy test. Insert n/a if condition is not applicable.

1. Aluminum mullion and glass spandrel panel curtainwall intersection with adjacent floor construction:
2. Gypsum sheathed curtainwall intersection with adjacent floor construction: \_\_\_\_\_.

- E. **OTHER:** Where another type of construction or penetrant is encountered, attach a separate sheet listing each condition and attach copy of the U.L. Test.

## SECTION 079200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes joint sealants for the following locations:
1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
    - a. Control and expansion joints in cast-in-place concrete
    - b. Joints in brick veneer wall surfaces.
    - c. Joints at pre-cast concrete units.
    - d. Joints between different materials listed above
    - e. Other joints as indicated.
  2. Exterior joints in the following horizontal traffic surfaces:
    - a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
    - b. Joints where railings and other components are installed in concrete slabs.
    - c. Other joints as indicated.
  3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
    - c. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - d. Tile control and expansion joints
    - e. Openings and joints in sound-rated partitions.
    - f. Other joints as indicated.
  4. Interior joints in the following horizontal traffic surfaces:
    - a. Control and expansion joints in cast-in-place concrete slabs.
    - b. Other joints as indicated.
- B. Related Sections include the following:
1. Sealants used in glazing are specified in Division 08 "Glazing."

#### 1.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

### 1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.
- C. Samples for verification purposes of each type and color of joint sealant required. Install joint sealant samples in 1/2-inch (13-mm)) wide joints formed between two 6-inch (150-mm) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Certificates from manufacturers of joint sealants attesting that their products comply with specification requirements and are suitable for the use indicated.
- B. Qualification data complying with requirements specified in "Quality Assurance" article. Include list of completed projects with project names addresses, names of Architects and Owners, plus other information specified.
- C. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- D. Product test reports for each type of joint sealants indicated, evidencing compliance with requirements specified.
- E. Preconstruction field test reports indicating which products and joint preparation methods demonstrate acceptable adhesion to joint substrates.
- F. Warranties: Special warranties specified in this Section.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an installer who has successfully completed at least three (3) joint sealer applications similar in type and size to that of this project within the last five (5) years. All workers used for work of this Section shall be experienced in the techniques of sealant application and shall be completely familiar with the published recommendations of the manufacturer of the joint sealant materials being used.

- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:
1. Locate test joints where indicated or, if not indicated, as directed by Architect.
  2. Conduct field tests for each application indicated below:
    - a. Each type of elastomeric sealant and joint substrate indicated.
    - b. Each type of non-elastomeric sealant and joint substrate indicated.
  3. Notify Architect one week in advance of the dates and times when mock-ups will be erected.
  4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
  5. Test Method: Test joint sealants by hand pull method described below:
    - a. Install joint sealants in 60 inches (1500 mm) joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealants to cure fully before testing.
    - b. Make knife cuts horizontally from one side of joint to the other followed by 2 vertical cuts approximately 2 inches (50 mm) long at side of joint and meeting horizontal cut at top of 2-inch (50-mm) cuts. Place a mark 1 inch (25 mm) from top of 2-inch (50-mm) piece.
    - c. Use fingers to grasp 2-inch (50-mm) piece of sealant just above 1-inch (25-mm) mark; pull firmly down at a 90-degree angle or more while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
  6. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
  7. Evaluation of Field Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.
- D. Field-Constructed Mock-Ups: Prior to installation of joint sealants, apply elastomeric sealants as follows to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution:
1. Joints in field-constructed mock-ups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants specified in this Section.
- E. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of the Division 01 Section covering this activity.

- F. Random Field Tests: Periodically test sealants, in place, for adhesion, using methods recommended by sealant manufacturer. Promptly replace any sealant that does not adhere, fails to cure, or fails to perform as specified by the sealant manufacturer.
- G. Field Water Test: Perform two field water tests on completed areas including as many conditions as possible. If leakage occurs during testing, repair as required, and re-test area and also test two additional locations.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer or below 40 deg F (4 deg C).
  - 2. When joint substrates are wet.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

#### 1.8 COORDINATION

- A. Coordinate the work with all sections referencing this section.

#### 1.9 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Manufacturer's Warranty: Provide written warranty agreeing to repair or replace, at no cost to Owner, defective materials for twenty (20) years, and workmanship for two (2)

years from the Date of Substantial Completion. Defective materials and workmanship shall include, but are not limited to:

1. Deterioration, aging or weathering of the work;
2. Water leakage and/or air leakage;
3. Sealant loss of adhesion, loss of cohesion, cracking or discoloration;
4. Staining or discoloration of adjacent surfaces;
5. Joint failure due to building or joint movement up to the limits prescribed by the manufacturer;
6. Cracks or bubbles on sealant surface.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealants to comply with the following:
  1. Provide selections made by Architect from manufacturer's standards or custom colors to match Architect's samples, as directed by Architect.
- C. Additional Movement Capability: Where additional movement capability is specified, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for Uses indicated.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project

### 2.2 LATEX JOINT SEALANT

- A. Acrylic-Emulsion Sealant: Manufacturer's standard, one part, nonsag, mildew-resistant, paintable latex acrylic-emulsion sealant complying with ASTM C 834, formulated to be paintable and recommended for exposed applications on interior locations involving joint movement of not more than plus or minus 5 percent.
  1. Available Products: Subject to compliance with requirements, latex joint sealants that may be incorporated in the Work include, but are not limited to, the following:
    - a. AC-20; Pecora Corporation.
    - b. Tremflex 834; Tremco.
    - c. ALEX PLUS; DAP .

- B. Uses: General interior use, paintable.

## 2.3 MILDEW-RESISTANT SILICONE JOINT SEALANT

- A. Single-Component Mildew-Resistant Silicone Sealant: Manufacturer's standard, non-modified, one-part, silicone sealant; complying with ASTM C 920, Type S, Grade NS, Class 25, Uses NT, G, A, and, as applicable to non-porous joint substrates indicated, O. Formulate sealant with fungicide and specifically intended for sealing interior joints with nonporous substrates and subject to in-service exposure to conditions of high humidity and temperature extremes.
  - 1. Available Products: Subject to compliance with requirements, silicone joint sealants that may be incorporated in the Work include, but are not limited to, the following:
    - a. 786 Mildew Resistant; Dow Corning.
    - b. Sanitary 1700; GE Silicones.
    - c. 898 Silicone Sanitary Sealant; Pecora Corporation.
    - d. Tremsil 600 White; Tremco.

- B. Uses: Interior use in wet locations, and all toilet and shower rooms.

## 2.4 NONSAG URETHANE JOINT SEALANT

- A. Multicomponent Nonsag Urethane Sealant: Manufacturer's standard, non-modified, multi-part, nonsag urethane sealant; complying with ASTM C 920, Type M, Grade NS, Class 25, Uses NT, M, G, A, and as applicable to joint substrates indicated, O.
  - 1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:
    - a. Dynatrol II, Pecora Corporation
    - b. Sikaflex-2c NS, Sika Corporation
    - c. Dymeric 240FC; Tremco.
    - d. Masterseal NP 2; Master Builders Solutions Div., BASF

- B. Uses: Interior use for exposed concrete or masonry wall control joints

## 2.5 SILICONE JOINT SEALANT

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100, for Use G, A, M, O; non-staining and field-tintable.
  - 1. Basis of Design Product: Provide Pecora Corporation "890FTS" sealant or equal manufactured by one of the following:
    - a. Dow Corning Corporation.
    - b. GE Advanced Materials - Silicones
    - c. Sika Corporation, Construction Products Division

d. Tremco Incorporated

- B. Additional Movement Capability: 100 percent movement in extension and 50 percent in compression for a total of 150 percent movement.
- C. Uses: General exterior use.

## 2.6 POURABLE URETHANE JOINT SEALANT

- A. Multicomponent Pourable Urethane Sealant: Manufacturer's standard, non-modified, two-part, urethane sealant; complying with ASTM C 920, Type M, Grade P, Class 25, Uses T, M, A and, as applicable to joint substrates indicated, O.
  - 1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:
    - a. NR-200 Urexpam, Pecora Corporation
    - b. Sikaflex 2c SL, Sika Corporation
    - c. Masterseal SL 2; Master Builders Solutions Div., BASF
- B. Uses: Interior or exterior use for level pavement or slab joints.

## 2.7 NONSAG URETHANE JOINT SEALANT

- A. Multi-Part Non-Sag Urethane Sealant: Except as otherwise indicated, provide manufacturer's standard, non-modified, two-part, urethane sealant; complying with ASTM C 920, Type M, Grade NS, Class 25, Uses T, M, A and, as applicable to joint substrates indicated, O.
  - 1. Available Products: Subject to compliance with requirements, urethane joint sealants that may be incorporated in the Work include, but are not limited to, the following:
    - a. Sikaflex 2c NS; Sika Corp
    - b. Dynatred, Pecora Corporation
    - c. Masterseal NP 2; Master Builders Solutions Div., BASF
- B. Uses: Interior or exterior use for pavement or slab joints where slope exceeds one percent.

## 2.8 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant: Non-sag (gun grade), non-flammable, latex-based sealant designed to limit sound transmission through interior STC-rated partitions. Sealant remains flexible and adhered to metal, wood, plaster, gypsum, and concrete after drying.
  - 1. Maintains the STC rating of partitions with intersections and penetrations sealed with product: Tested by independent, accredited, NVLAP facility according to ASTM E 90.

2. Products: Provide one of the following:
  - a. QuietZone Acoustic Sealant by Owens Corning.
  - b. OSI GreenSeries SC-175 Draft & Acoustical Sound Sealant by Henkel Corporation
  - c. Pecora AIS-919: Acoustical and Insulation Latex Sealant by Pecora Corporation
  - d. Smoke 'N' Sound Acoustical Sealant by Specified Technologies Inc.

- B. Uses: At penetrations through and intersections of sound-rated wall, floor and ceiling assemblies in order to preserve their ability to reduce airborne sound impact noise transmission.

## 2.9 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
  1. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
  2. Manufacturer: Provide Cera-Rod manufactured by W.R. Meadows, Inc., or equivalent.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## 2.10 JOINT FILLERS FOR EXTERIOR CONCRETE SLABS

- A. General: Provide joint fillers of thickness and depth indicated, or if not indicated 1/2" thick by depth of joint.
- B. Bituminous Fiber Joint Filler: Provide preformed strips of with asphalt binder encased between two layers of saturated felt or glass-fiber felt, complying with ASTM D 1751.
  1. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint and seal with sealant.

## 2.11 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.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## 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 joint sealant performance. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer 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 concrete, masonry, unglazed surfaces of ceramic tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, 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 from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
  - 3. Remove laitance and form release agents from concrete.
  - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations.

Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint sealant manufacturer's printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Installation of Sealant Backings: Install sealant backings to comply with the following requirements:
  - 1. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
    - a. Do not leave gaps between ends of joint fillers.
    - b. Do not stretch, twist, puncture, or tear joint fillers.
    - c. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
  - 2. Install bond breaker tape between sealants where backer rods are not used between sealants and joint fillers or back of joints.
- D. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
  - 1. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
    - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

### 3.4 CLEANING

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

### 3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so that and 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 SUMMARY**

- A. Section includes the following hollow-metal work:

1. Steel door frames
2. Fire-rated frames

#### **1.2 DEFINITIONS**

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

#### **1.3 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.
- B. Coordinate preparation of shop drawings for hollow metal doors and frames with door hardware submittals specified in Section 087100. Shop drawings for work of this section will not be reviewed and approved until the hardware submittals in Section 087100 are submitted and approved.

#### **1.4 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.

#### **1.5 ACTION SUBMITTALS**

- A. Product Data: For each type of product. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  2. Locations of reinforcement and preparations for hardware.
  3. Details of each different wall opening condition.
  4. Details of anchorages, joints, field splices, and connections.
  5. Details of accessories.

- C. **Schedule:** Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

## 1.6 INFORMATIONAL SUBMITTALS

- A. **Product Test Reports:** For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

## 1.7 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.
- 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- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

# 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. Ceco Door Products; an Assa Abloy Group company.
  - 2. Curries Company; an Assa Abloy Group company.
  - 3. Republic Doors and Frames.
- B. **Source Limitations:** Obtain hollow-metal work from single source from single manufacturer.

## 2.2 PERFORMANCE REQUIREMENTS

- A. **Fire-Rated Assemblies:** Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. **Smoke- and Draft-Control Assemblies:** Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

## 2.3 INTERIOR FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Frames: SDI A250.8, Level 3. Provide for interior door and frame locations.
  - 1. Physical Performance: Level A according to SDI A250.4.
  - 2. Frames:
    - a. Materials: Minimum thickness of 16 gage, 0.053 inch (1.3 mm), uncoated, steel sheet for the following locations:
      - 1) Wood doors, unless otherwise indicated.
    - b. Construction: Full profile welded.
  - 3. Exposed Finish: Prime door and frames

## 2.4 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 (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
  - 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
  - 3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:
  - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
  - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

## 2.5 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

- D. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) 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 B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. 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.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
- H. 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.
- I. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.6 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 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. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
  - 3. 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.
  - 4. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:

- 1) Two anchors per jamb up to 60 inches (1524 mm) high.
    - 2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
    - 3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
    - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.
  - b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
    - 1) Three anchors per jamb up to 60 inches (1524 mm) high.
    - 2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
    - 3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
    - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
  - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.
5. Head Anchors: Two anchors per head for frames more than 42 inches (1067 mm) wide and mounted in metal-stud partitions.
6. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
  - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
  - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- D. 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.

## 2.7 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.

## 2.8 ACCESSORIES

- A. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

## 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 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. At fire-rated openings, install frames according to NFPA 80.
    - b. 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.
    - c. Install frames with removable stops located on secure side of opening.
    - d. Install door silencers in frames before grouting.

- e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
  - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
  - g. 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. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
- 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
- 5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
- 6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- 7. 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 (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
  - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

### 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.

END OF SECTION 081113

## **SECTION 081416 - FLUSH WOOD DOORS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Solid-core doors with wood-veneer faces for transparent finish.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

**B. Related Requirements:**

1. Division 08 Section "Hollow Metal Doors and Frames" for steel door frames.
2. Division 08 Section "Glazing" for glass view panels in flush wood doors.

#### **1.2 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference:** Conduct conference at Project site.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data:** For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.

- B. Shop Drawings:** Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Requirements for veneer matching.
6. Doors to be factory finished and finish requirements.
7. Fire-protection ratings for fire-rated doors.
8. Provide schedule of doors based on door schedule included in contract documents

- C. Samples for Initial Selection:** For factory-finished doors.

**D. Samples for Verification:**

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
2. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For door inspector.
  - 1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1
- B. Sample Warranty: For special warranty.
- C. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- D. Field quality control reports.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

#### 1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during remainder of construction period.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
    - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.
  - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
  - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.
- B. Contractor's Responsibilities: Replace doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty

## 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. Marshfield – Algoma by Masonite Architectural
2. Oshkosh Door Company.
3. VT Industries, Inc. (formerly Eggers)

- B. Source Limitations: Obtain flush wood doors from single manufacturer.

### 2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.

- B. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C. After 5 minutes into the NFPA 252 test, the neutral pressure level in the furnace shall be established at 40 inches (1016 mm) or less above the sill. Provide "Category A" Positive Pressure Tested doors for all fire-rated wood doors.

1. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile; UL category A. Comply with specified requirements for exposed edges.
3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

- C. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

- D. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-2, made with binder containing no urea-formaldehyde.
2. Blocking: Provide wood blocking in particleboard-core doors as follows:
  - a. 5-inch (125-mm) top-rail blocking, in doors indicated to have closers.

- b. 5-inch (125-mm) bottom-rail blocking, in doors and doors indicated to have kick, mop, or armor plates.
- c. 4-1/2-by-10-inch (114-by-250-mm) lock blocks and 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.

E. Structural-Composite-Lumber-Core Doors:

- 1. Structural Composite Lumber: WDMA I.S.10.
  - a. Screw Withdrawal, Face: 700 lbf (3100 N).
  - b. Screw Withdrawal, Edge: 400 lbf (1780 N).

F. Mineral-Core Doors:

- 1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
- 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware, and as follows:
  - a. 5-inch (125-mm) top-rail blocking.
  - b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
  - c. 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
  - d. 4-1/2-by-10-inch (114-by-250-mm) lock blocks and 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
- 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
  - a. Screw-Holding Capability: 550 lbf (2440 N) per WDMA T.M.-10.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

- 1. Grade: Premium, with Grade A faces.
- 2. Species: Match existing
- 3. Cut: Match existing.
- 4. Match between Veneer Leaves: Book match.
- 5. Assembly of Veneer Leaves on Door Faces: Balance match.
- 6. Exposed Vertical Edges: Same species as faces - edge Type A
- 7. Core:
  - a. Non-Rated Doors: Particleboard except provide doors with either glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors with full light or 2 lights
  - b. Fire-Rated Doors: Mineral core.
- 8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
- 9. WDMA I.S.1-A Performance Grade: Extra Heavy Duty

10. Basis of Design Doors: Marshfield – Algoma Aspiro Series by Masonite Architectural, or equal.

## 2.4 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
  1. Wood Species: Same species as door faces.
  2. Profile: Manufacturer's standard shape.
  3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

## 2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
- B. Align and fit doors in frames with uniform clearances and bevels as indicated below. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
  1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 5/8 inch (16 mm) from bottom of door to top of threshold unless otherwise indicated.
    - a. Comply with NFPA 80 for fire-rated doors.
  2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
  3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
- D. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- E. Openings: Factory cut and trim openings through doors.
  1. Light Openings: Trim openings with moldings of material and profile indicated.

1. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."

### 3.2 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.

- B. Factory finish doors.

- C. Transparent Finish:

1. Grade: Premium.
2. Finish: WDMA TR-6 catalyzed polyurethane.
3. Staining: As selected by Architect.
4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
5. Sheen: Satin

## PART 4 - EXECUTION

### 4.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
  1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 4.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
  1. Install fire-rated doors according to NFPA 80.
  2. Install smoke- and draft-control doors according to NFPA 105.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

### 4.3 FIELD QUALITY CONTROL

- A. Inspection Agency: Engage a qualified inspector to perform inspections and commissioning activities and to furnish reports to Architect.
  - B. Inspections:
    - 1. Fire-Rated Door Inspections: Inspect each fire-rated door according to NFPA 80, Section 5.2.
  - C. Commissioning: Commissioning of all doors shall be performed by the installer supervised by an Architectural Hardware Consultant who is thoroughly knowledgeable of the various components and systems. Include the following:
    - 1. Testing of opening force, closing device, complete closure of the door within clearance tolerances, and full engagement of latch(es) where required by door type.
    - 2. Verify cleanliness of labels, fusible links and other components that cannot be painted.
    - 3. Functional testing of automatic-closing or power-operated fire door assemblies and electrically controlled latching hardware or release devices shall be coordinated with all components of the electrically controlled system.
    - 4. After all doors have been commissioned and prior their acceptance, the Architect, in consultation with the Campus and Fund, will select doors (at least one for each operational type) whose full range operation shall be demonstrated by the Contractor to the satisfaction of the Architect.
  - D. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
  - E. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
  - F. Prepare and submit separate inspection report for each fire-rated door assembly indicating compliance with each item listed in NFPA 80.
  - G. Prepare and submit commissioning report of all doors.
- 4.4 ADJUSTING
- A. Operation: Rehang or replace doors that do not swing or operate freely.
  - B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

## **SECTION 083113 - ACCESS DOORS AND FRAMES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Wall access doors and frames for interior locations.
2. Fire-rated wall access doors and frames for interior locations
3. Ceiling access doors and frames for interior locations.
4. Fire-rated ceiling access doors and frames for interior locations.

**B. Locations and Quantities of Access Doors:** Not all access doors are shown on the Drawings. It is the intent of this section that access doors be provided wherever access is required for operation and maintenance of concealed equipment, dampers, valves, controls or similar devices.

**C. Cylinders for access doors are specified in Division 08 Section "Door Hardware."**

**D. Related Requirements:**

1. Division 07 Section "Roof Accessories" for roof hatches.
2. Division 23 Section "Air Duct Accessories" for heating and air-conditioning duct access doors.

#### **1.2 ACTION SUBMITTALS**

**A. Product Data:** For each type of product. Include construction details, fire ratings, 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.

**C. Samples:** For each door face material, at least 3 by 5 inches (75 by 125 mm) in size, in specified finish.

**D. Product Schedule:** Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

#### **1.3 COORDINATION**

**A. Verification:** Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule specified in "Submittals" Article

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics according to the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
  2. NFPA 288 for fire-rated access door assemblies installed horizontally.

### 2.2 PRODUCTS, GENERAL

- A. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

### 2.3 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:
1. Babcock-Davis.
  2. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
  3. Karp Associates, Inc.
  4. Larsen's Manufacturing Company.
  5. Milcor Inc.
  6. Nystrom, Inc.
- B. Flush Access Doors, with Exposed Trim, for CMU Surfaces: Units consisting of frame with exposed trim, door, hardware, and complying with the following requirements
1. Basis-of-Design Product: Nystrom Model NT, Universal Flush Access Door.
  2. Assembly Description: Fabricate door to fit flush to frame. Provide flange integral with frame, 1 inch wide, overlapping surrounding finished surface.
  3. Locations: Provide at non-rated concrete block walls.
  4. Uncoated Steel Sheet for Door: Nominal 16 gage.
    - a. Finish: Factory prime.
  5. Stainless-Steel Sheet for Door for Toilet Rooms, Shower Rooms, and Other Wet Areas: Nominal 16 gage; No. 4 finish.
  6. Frame Material: Nominal 0.060 inch (1.52 mm), 16 gage
  7. Hinges: Concealed continuous piano hinge.
  8. Locks: Provide with mortise lock prep.
- C. Trimless, Flush Access Doors for Gypsum Board Surfaces: Units consisting of frame, concealed edge trim, door, hardware, and complying with the following requirements:

1. Basis-of-Design Product: Nystrom Model NW or equal.
  2. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
  3. Locations: Provide at non-rated gypsum board walls and ceilings.
  4. Uncoated Steel Sheet for Door: Nominal 16 gage.
    - a. Finish: Factory prime.
  5. Stainless-Steel Sheet for Door for Toilet Rooms, Shower Rooms, and Other Wet Areas: Nominal 16 gage; No. 4 finish.
  6. Frame Material: Nominal 0.060 inch (1.52 mm), 16 gage.
  7. Hinges: Concealed continuous piano hinge.
  8. Locks: Provide with mortise lock prep.
- D. Recessed Doors for Acoustical Ceiling Tiles: Units consisting of frame with no exposed trim, recessed door to receive tile, hardware, and complying with the following requirements.
1. Basis-of-Design Product: Karp, Model DSC-210, Recessed Acoustical Ceiling Tile Access Doors.
  2. Locations: Provide at non-rated acoustical ceilings tiles.
  3. Uncoated Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gage thick steel sheet; recessed 1-inch (25.4 mm).
    - a. Finish: Factory prime.
  4. Stainless-Steel Sheet for Door for Toilet Rooms, Shower Rooms, and Other Wet Areas: Nominal 0.060 inch (1.52 mm), 16 gage; No. 4 finish.
  5. Frame Material: Nominal 0.074 inch (1.9 mm), 14 gage.
  6. Hinges: Concealed, pivoting-rod type.
  7. Locks: Provide with mortise lock prep.
- E. Insulated, Fire-Rated Access Doors for Drywall Walls and Ceilings: Units consisting of frame with gypsum board bead concealed edge trim, self-latching insulated door, and hardware, and complying with the following requirements:
1. Basis-of-Design Product: Nystrom Model IW, Insulated Fire Rated Access Door, with Drywall Bead, for Walls and Ceilings.
  2. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release.
  3. Locations: Provide at rated gypsum board walls and ceilings.
  4. Fire-Resistance Ratings:
    - a. Walls: 1-1/2 hours.
    - b. Ceilings: 3 hours.
  5. Uncoated Steel Sheet for Door: 20 ga., 0.0359-inch- (0.91-mm-) thick steel sheet, welded pan type, filled with 2-inch (50 mm) thick fire-rated mineral-fiber insulation.
    - a. Finish: Factory prime.

6. Stainless-Steel Sheet for Door for Toilet Rooms, Shower Rooms, and Other Wet Areas: Same gage and style as steel door; with No. 4 finish.
  7. Frame Material: 16 ga., 0.0598-inch- (1.52-mm-) thick steel sheet, 1-inch (25.4 mm) wide, surrounded by galvanized drywall bead.
  8. Hinges: Concealed continuous piano hinge.
  9. Locks: Provide with mortise lock prep.
- F. Insulated, Fire-Rated Access Doors for CMU Walls: Units consisting of frame with exposed edge trim, self-latching insulated door, and hardware, and complying with the following requirements:
1. Basis-of-Design Product: Nystrom Model IT, Insulated Fire Rated Access Door, with Exposed Flange, for Walls and Ceilings.
  2. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide flange integral with frame, 1 inch (25 mm) wide, overlapping surrounding finished surface. Provide self-latching door with automatic closer and interior latch release.
  3. Locations: Provide at rated concrete block walls.
  4. Fire-Resistance Ratings:
    - a. Walls: 1-1/2 hours.
  5. Uncoated Steel Sheet for Door: 20 ga., 0.0359-inch- (0.91-mm-) thick steel sheet, welded pan type, filled with 2-inch (50 mm) thick fire-rated mineral-fiber insulation.
    - a. Finish: Factory prime.
  6. Stainless-Steel Sheet for Door for Toilet Rooms, Shower Rooms, and Other Wet Areas: Same gage and style as steel door; with No. 4 finish.
  7. Frame Material: 16 ga., 0.0598-inch- (1.52-mm-) thick steel sheet, 1-inch (25.4 mm) wide exposed trim.
  8. Hinges: Concealed continuous piano hinge.
  9. Locks: Provide with mortise lock prep.

## 2.4 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. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- D. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304. Remove tool and die marks and stretch lines or blend into finish.
- E. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T5.

- F. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- G. Frame Anchors: Same type as door face.
- H. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- I. Mortise locks are specified in Section 087100.

## 2.5 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. For concealed flanges with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
  - 2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
  - 3. Provide mounting holes in frames for attachment of units to metal or wood framing.
  - 4. Provide mounting holes in frame for attachment of masonry anchors.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
- E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
  - 1. Cylinder and keys are specified in Section 087100 "Door Hardware."

## 2.6 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, VOC-free, electrostatic-applied powder coat finish immediately after surface preparation and pretreatment.

E. Stainless-Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
  - a. Run grain of directional finishes with long dimension of each piece.
  - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
  - c. Directional Satin Finish: No. 4.

### 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. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. 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 SUMMARY

- A. This Section includes the following:
  - 1. Commercial door hardware for the following:
    - a. Swinging doors
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 08 Section "Hollow Metal Doors and Frames" for factory prefabricating and factory premachining of frames for door hardware.
  - 2. Division 08 Section "Flush Wood Doors" for factory prefabricating and factory premachining of doors for door hardware
- C. Products furnished but not installed under this Section include:
  - 1. Cylinders and cores for locks on access doors.

#### 1.2 SUBMITTALS

- A. Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
- B. Final hardware schedule coordinated with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - 1. Final Hardware Schedule Content: Based on hardware indicated, organize schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Include the following information:
    - a. Type, style, function, size, and finish of each hardware item.
    - b. Name and manufacturer of each item.
    - c. Fastenings and other pertinent information.
    - d. Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door and frame schedule.
    - e. Explanation of all abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for hardware.
    - g. Door and frame sizes and materials.
    - h. Keying information.
  - 2. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work that is critical in the Project construction schedule. Include with schedule the

- product data, samples, shop drawings of other work affected by door hardware, and other information essential to the coordinated review of schedule.
3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has been fulfilled.

- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article.
- D. Templates for doors, frames, and other work specified to be factory prepared for the installation of door hardware. Check shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

### 1.3 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer.
- B. Supplier Qualifications: A recognized architectural door hardware supplier, with warehousing facilities in the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that employs an experienced Door and hardware Institute, Architectural Hardware Consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the Work, for consultation and who shall review the schedule for overall coordination of hardware.
  1. Require supplier to meet with Owner to finalize functions of locking devices, keying requirements and to obtain final instructions in writing.
  2. Hardware schedule shall be prepared and sealed by AHC.
- C. Regulatory Requirements: Comply with provisions of the following:
  1. Comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," and ANSI A117.1-09 , as follows:
    - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
    - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
      - 1) Interior Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
      - 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
    - c. Thresholds: Not more than ½ inch (13 mm high). Bevel raised thresholds with a slope of not more than 1:2.
  2. NFPA 101: Comply with the following for means of egress doors:

- a. Latches, Locks, and Exit Devices: Not more than 15 lbf (67 N) to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
  - b. Door Closers: Not more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.
  - c. Thresholds: Not more than 1/2 inch (13 mm) high.
- D. Fire-Rated Doors and Emergency-Exit Openings: Provide door operators that comply with NFPA 80 requirements for doors as emergency exits and that do not interfere with fire ratings.
- E. Fire-Rated Openings: Provide door hardware for fire-rated openings that complies with NFPA Standard No. 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by UL, Warnock Hersey, FM, or other testing and inspecting organization acceptable to authorities having jurisdiction for use on types and sizes of doors indicated in compliance with requirements of fire-rated door and door frame labels.
- F. Function and Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Incorporate function and keying conference decisions into final hardware and keying schedule after reviewing door hardware functions and keying system including, but not limited to, the following:
  - 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
  - 2. Preliminary key system schematic diagram.
  - 3. Address for delivery of keys.

#### 1.4 PRODUCT HANDLING

- A. Tag each item or package separately with identification related to final hardware schedule, and include basic installation instructions with each item or package.
- B. Packaging of door hardware is responsibility of supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.
- C. Inventory door hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- D. Deliver individually packaged door hardware items promptly to place of installation (shop or Project site).
- E. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable.

so that completion of the Work will not be delayed by hardware losses both before and after installation.

## 1.5 PROJECT CONDITIONS

- A. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.
- B. Upon request, check the Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

## 1.6 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
  - 1. Structural failures including excessive deflection, cracking, or breakage.
  - 2. Faulty operation of operators and door hardware.
  - 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- C. Warranty Period: From date of Substantial Completion, unless otherwise indicated.:
  - 1. Closers: Ten (10) years.
  - 2. Locksets: Three (3) years
  - 3. Exit Devices: Three (3) years
  - 4. All other Hardware: Two (2) years.

## 1.7 MAINTENANCE AND TRAINING

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Provide products and manufacturers as listed in "Schedule of Acceptable Manufacturers and Products" included at end of this section.

## 2.2 SCHEDULED HARDWARE

- A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of finish hardware are indicated in the "Hardware Schedule" at the end of this Section. Products are identified by using hardware designation numbers of the following:
  - 1. Manufacturer's Product Designations: The product designation and name of one manufacturer are listed for each hardware type required for the purpose of establishing minimum requirements. Provide either the product designated, or equivalent product approved by the Architect.

## 2.3 MATERIALS AND FABRICATION

- A. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
- B. Furnish screws for installation with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint" surfaces to receive painted finish.
- C. Provide concealed fasteners for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.
  - 1. Thru-bolting of hardware will only be permitted where required by NFPA 80, door assembly listing requirements, and the door assembly manufacturer's installation instructions. Fasteners for closer, exit devices and similar hardware that are exposed on opposite face of door from unit will not be permitted.

## 2.4 HINGES, BUTTS

- A. Templates: Provide only template-produced units for hinges at new frames. Provide units to match existing frame mortises where frame is being re-used.
- B. Screws: Provide Phillips flat-head screws complying with the following requirements:
  - 1. For metal doors and frames install machine screws into drilled and tapped holes.
  - 2. For fire-rated wood doors install #12 x 1-1/4-inch, threaded-to-the-head steel wood screws.

3. Finish screw heads to match surface of hinges.

- C. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:

1. Out-Swing Corridor Doors: Nonremovable pins.
2. Interior Doors: Nonrising pins.
3. Tips: Flat button and matching plug, finished to match leaves.

## 2.5 LOCK CYLINDERS, CORES AND KEYING

- A. Keying System: Provide keying system to match Owner's existing system; coordinate with Owner's requirements.
- B. Equip locks with Owner's standard manufacturer's cylinders for interchangeable-core 6-pin or 7-pin tumbler inserts to match Owner's existing system. Furnish only temporary inserts for the construction period, and remove these when directed.
1. Furnish final cores and keys for installation by Owner.
- C. Metals: Construct lock cylinder and core parts from brass or bronze, stainless steel, or nickel silver.
- D. Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
1. Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."
  2. Design master key system allowing for 300 percent expansion.
- E. Key Material: Provide keys of nickel silver only.
- F. Key Quantity: Furnish 3 change keys for each lock, 5 master keys for each master system, and 5 grandmaster keys for each grandmaster system.
1. Deliver keys to Owner.

## 2.6 LOCKS, LATCHES AND BOLTS

- A. Locksets and Latchsets: Provide ANSI A156.2, Series 4000, Grade 1, UL listed, cylindrical type locksets with 2-3/4 inch backset, with a core housing equipped to accept Owner's standard 6-pin or 7-pin cores, as scheduled.
1. Lever Trim: Match existing.
- B. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.

1. Provide flat lip strikes for locks with 3-piece, antifriction latchbolts as recommended by manufacturer.
2. Provide recess type top strikes for bolts locking into head frames, unless otherwise indicated.
3. Provide dust-proof strikes for foot bolts, except where special threshold construction provides nonrecessed strike for bolt.
4. Provide roller type strikes where recommended by manufacturer of the latch and lock units.

C. Lock Throw: Provide 5/8-inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

1. Provide 1/2-inch minimum throw of latch for other bored and preassembled types of locks and 3/4-inch minimum throw of latch for mortise locks. Provide 1-inch minimum throw for all dead bolts.

## 2.7 EXIT DEVICES

- A. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- B. Fire Exit Devices: Complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.
- C. Outside Trim: Lever type of material and finish to match locksets, unless otherwise indicated. Match design for locksets and latchsets.
- D. Through Bolts: DO NOT through bolt exit devices and trim on doors. Prepare doors with reinforcing and blocking to receive hardware.

## 2.8 CLOSERS AND DOOR CONTROL DEVICES

- A. Size of Units: Except as otherwise specifically indicated, provide non-sized closers for all units.
- B. Access-Free Manual Closers: Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ADA provisions for door opening force and delayed action closing.
- C. Piston: Minimum 1-1/2" diameter one piece steel.
- D. Provide all parallel arm closers with one piece forged extra duty arms or 3/8-inch (9 mm) thick stamped solid steel main and one piece forged or 5/16-inch (8 mm) thick stamped solid steel forearm with bronze bushings.

1. Provide spring cushion arms at all exterior doors, and where indicated.
  2. Provide standard stop arms at all parallel arm closers scheduled for interior doors where a wall or floor stop is not feasible, and where indicated.
  3. Provide only handed closers.
  4. Provide only heavy-duty closers recommended by manufacturer for instructional applications. Standard weight products are not acceptable..
- E. Provide all regular arm closers with forged or stamped steel mainarm.
- F. Provide heavy-duty steel stud shoulder bolts (including main arm and forearm connection) at all regular arm, hold open arm, built-in stop arm, and hold open / built-in stop closers.
- G. Provide exterior closers with all weather hydraulic fluid, suitable from 120°F to -35°F without adjustment.
- H. Provide closers with powder coat finish on body, arm and plate adapter, or corrosion inhibitor primer and sprayed finish coat.
- I. Provide grey resilient parts for exposed bumpers.

## 2.9 SMOKE SEALS

- A. General: Provide continuous smoke seals on doors where indicated or scheduled.
- B. Automatic Door Bottoms (Drop Seal): Provide fully mortised type with silicon gasket and clear satin anodize finish on metal portions.
- C. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled, based on testing according to UL 1784.
- D. Fire-Labeled Gasketing: Assemblies complying with NFPA 80-1999 that are listed and labeled, based on testing according to UL 10B or NFPA 252.

## 2.10 HARDWARE FINISHES

- A. Provide satin chrome, BHMA 626 (US26D) finish for all hardware items to greatest extent possible or manufacturer's standard finish matching this finish.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame supports, and other conditions affecting performance of door hardware.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
  - 1. All doors with lever trim shall have hardware mounted at heights required by ADA (Americans with Disabilities Act) regulations.
  - 2. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
  - 3. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."
- B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 09 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- C. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- D. Pre-drill and countersink doors, frames and units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- E. Hand tighten screws and fasteners, use of power driven tools must be limited to preliminary driving screws if permitted by door and hardware manufacturer.
- F. Replace doors damaged by improper hardware installation.
- G. Seals: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

### 3.3 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
  - 1. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

- B. Adjust door closers in accordance with manufacturer's instructions for proper door closer adjustment for spring power, backcheck, closing and latching speed.
- C. Clean adjacent surfaces soiled by hardware installation.
- D. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
- E. Six-Month Adjustment: Approximately six months after the date of Substantial Completion, the Installer, accompanied by representatives of the manufacturers of latchsets and locksets and of door control devices, and of other major hardware suppliers, shall return to the Project to perform the following work:
  - 1. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.
  - 2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
  - 3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.
  - 4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

### 3.4 HARDWARE SCHEDULE

- A. **SCHEDULE OF ACCEPTABLE MANUFACTURERS AND PRODUCTS:** Manufacturers and products are listed in Hardware Sets to establish the general product appearance, type and quality intended for use. Certain items have been specially selected for their appearance and function. Equal products of manufacturers other than those listed below may be acceptable subject to the approval of the Architect. Substitutions proposed for hardware items must be equivalent in every way, as judged solely by Architect.
- B. The following list indicates the Owner's standard manufacturers for provision of type of hardware listed, unless equivalent products or manufacturers are specified. Refer to the Hardware Sets for the scheduled products required per door opening.
  - 1. Hinges: Hager BB 1279, full mortise standard weight, BHMA 652 (US26D) finish; 4-1/2" x 4-1/2", 2-ball bearing 5-knuckle; or equivalent by Bommer, McKinney. or Stanley.
  - 2. Locksets/Latchsets: Cylindrical lockset; Corbin Russwin CL3300 Series, with Newport style lever and rose, with interchangeable/ removable core, BHMA 626 (US26D) finish.
  - 3. Deadbolts: Deadbolt with thumbturn inside and status indicator both sides to indicate room occupancy status, with emergency override key outside; Corbin Russwin DL2261 or equal.

4. Exit Devices: Von Duprin 99 Series, trim as scheduled, with lever trim to match locksets, less cylinders, BHMA 626 (US26D) finish, cylinder dogging feature at non-fire exit devices..
5. Interchangeable Cores: As selected by Owner, for insertion in locksets, exit devices, and elsewhere as scheduled; finish to match lockset. Provide with key and concealed cylinder stamping.
6. Cylinders for use with Interchangeable Core: As selected by Owner. Provide with temporary construction cores, finish to match lockset. Provide Construction cores for all cylinders at exit devices as well
7. Closers: Provide parallel or standard arm closers as indicated in the General Notes below; reduced opening force for handicapped; in aluminum powder painted finish BHMA 689; LCN 4040 Series with full metal covers ("Designer" covers).
8. Silencers: Don-Jo 1608; or equivalent by Ives or Rockwood.
9. Wall Stops: Rockwood No. 406, 407 or 408 as required by wall material, with grey bumper and BHMA 630 finish; or equivalent by Ives
10. Floor Stops: Rockwood No.441 or 443 as required, provide risers 449 as required, with grey bumper and BHMA 630 finish; or equivalent by Ives.
11. Overhead Stops: Rockwood OH 1000 Series stainless steel, of size required, or equivalent by Ives.
12. Smoke Seal: Pemko S-88, or equivalent.

C. SCHEDULED HARDWARE SETS

GENERAL NOTES:

1. Doors hardware shall not prohibit exiting from spaces.
2. Provide hardware finishes specified above unless noted otherwise for a specific set or door.
3. Provide all required installation accessories and options necessary for complete installation of each hardware component, to ensure proper operation of the product.
4. Coordinate all hardware components for each door leaf for overall compatibility.
5. Through-bolting of hardware is not permitted, coordinate all blocking requirements with door manufacturer.
6. Provide all interior doors with wall stops, one per leaf; provide floor type as required when wall stop not feasible. Specific stops scheduled are exceptions to this.
7. Provide thresholds where indicated on drawings.
8. Provide 3 silencers per single door and 2 silencers per pair doors except omit on weatherstripped and smoke and sound sealed doors.
9. Where door closers are scheduled below, provide parallel or standard arm closers placed on the least conspicuous side of the door, unless noted otherwise.

10. Provide cylinders with final cores for access doors as required; coordinate with applicable specification section.
11. Provide specified smoke seal at perimeter for all rated openings on corridor walls and at all smoke control doors where smoke compartments are indicated on drawings. In addition, provide specified smoke astragal seal at all pairs of doors at rated openings on corridor walls as required by door manufacturer to meet smoke sealing requirement .
12. Functions: The lockset/exit device function specified is for BIDDING ONLY. Review all lock and exit device functions with Owner prior to submission of door schedule.

#### D. HARDWARE SETS

##### SET 1 - SINGLE INTERIOR DOOR

- 3 Hinges
- 1 Lockset, privacy function
- 1 Deadbolt with occupancy status indicator
- 1 Closer
- 1 Wall stop
- 1 Kickplate

##### SET 2 - SINGLE INTERIOR DOOR

- 3 Hinges
- 1 Lockset, storeroom function
- 1 Closer
- 1 Wall stop
- 1 Kickplate

##### SET 3 - SINGLE INTERIOR DOOR

- 3 Hinges
- 1 Latchset, passage function
- 1 Closer
- 1 Wall stop
- 1 Kickplate

##### SET 4 - SINGLE INTERIOR DOOR

- 3 Hinges
- 1 Closer
- 1 Lockset, entrance function

- 1 Wall stop
- 1 Kickplate

**SET 5 - SINGLE INTERIOR DOOR, FIRE RATED**

- 3 Hinges
- 1 Rim panic device
- 1 Closer
- 1 Wall stop
- 1 Kickplate

END OF SECTION 087100

## **SECTION 088000 - GLAZING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Doors.
2. Glazing film on existing glazing.

#### **1.2 SUBMITTALS**

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For each type of glazing film specified in the form of 6-inch square samples.
- C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
1. Indicate locations and extent of each type of glazing film to be provided
- D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- E. Product Test Reports: From a qualified testing agency indicating the following products comply with requirements, based on comprehensive testing of current products:
1. Glazing sealants.
  2. Fire resistive glazing
- G. Warranties: Special warranties specified in this Section.

#### **1.3 QUALITY ASSURANCE**

- A. Source Limitations: Obtain each type of glass from one primary-glass manufacturer.
- B. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
- C. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.

1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
  2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
- D. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by UL, for fire ratings indicated, based on testing according to NFPA 252.
- E. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
  2. Safety glass includes fully tempered glass and fire-resistant glass.
- F. Fire-Rated Glass: Permanently mark fire-rated glass with certification label of certification agency acceptable to authorities having jurisdiction indicating manufacturer name, test standard and fire-rating.
- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines."
  2. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01.
- 1.4 DELIVERY, STORAGE, AND HANDLING
- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- 1.5 PROJECT CONDITIONS
- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

## 1.6 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Special Warranty on Fire Rated Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
  - 1. Warranty Period: 5 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

### 2.2 PRIMARY FLOAT GLASS

- A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); Class 1 unless otherwise indicated in schedules at the end of Part 3.

### 2.3 HEAT-TREATED FLOAT GLASS

- A. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
- A. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent glass, flat); Quality q3 (glazing select); class, kind, and condition as indicated in schedules at the end of Part 3.

### 2.4 FIRE RATED GLAZING

- A. Fire-Rated Glazing Product (Laminated Ceramic Glazing Material): Proprietary Category I and II safety glazing product in the form of 2 lites of clear ceramic glazing material laminated together to produce a laminated lite of 5/16-inch nominal thickness; polished on both surfaces, weighing 4 lb/sq. ft.; and as follows:
1. Fire-Protection Rating: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
  2. Polished on both surfaces, transparent.
  3. Product: "FireLite Plus Premium" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.

## 2.5 ELASTOMERIC GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.
- B. Single-Component Neutral-Curing Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 50; Uses NT, M, G, A, and, as applicable to joint substrates indicated, O.
1. Products:
    - a. Dow Corning Corporation; 791.
    - b. Dow Corning Corporation; 795.
    - c. GE Silicones; SilPruf NB SCS9000.
    - d. GE Silicones; UltraPruf II SCS2900.
    - e. Pecora Corporation; 865.
    - f. Pecora Corporation; 895.
    - g. Pecora Corporation; 898
- C. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

## 2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper

backing; and complying with ASTM C 1281 and AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

- B. Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
  - 1. Type 1, for glazing applications in which tape acts as the primary sealant.
  - 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
- C. Glazing Tapes for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

## 2.7 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Silicone elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.
- H. Window Film: Provide film fabricated from PET, not PVC.
  - 1. Color and Pattern: White frosted gradient pattern as selected by Architect from all available patterns.
  - 2. Basis of Design Product: 3M FASARA Window Film, by 3M Company, or equal products by one of the following:
    - a. LINTEC
    - b. LLumar by Eastman Performance Films

## 2.8 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep system.
  - 3. Minimum required face or edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

### 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where the length plus width is larger than 50 inches (1270 mm) as follows:
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.

- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.5 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

### 3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

### 3.7 PROTECTION AND CLEANING

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for

build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.

- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

### 3.8 GLASS SCHEDULE

#### A. Interior Glazing, as Scheduled:

- 1. Non-Fire Rated Doors, Transoms, Sidelights and Borrowed Lights: 1/4 inch clear tempered glass.
- 2. Fire Rated Doors, Transoms, Sidelights and Borrowed Lights: Laminated ceramic glazing material 5/16 inches thick; "FireLite Plus Premium" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.
- 3. Bathroom Windows, Where Indicated: Glazing film. Window film shall be applied to interior glass surfaces in locations as indicated on Drawings.

END OF SECTION 088000

## **SECTION 092116.23 - GYPSUM BOARD SHAFT WALL ASSEMBLIES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes: Gypsum board shaft wall assemblies.

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: For each component of gypsum board shaft wall assembly.

#### **1.3 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

#### **1.4 FIELD CONDITIONS**

- A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

### **PART 2 - PRODUCTS**

#### **2.1 PERFORMANCE REQUIREMENTS**

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

#### **2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES**

- A. Fire-Resistance Rating: 1 hour and 2 hours as indicated.
- B. STC Rating: As indicated.
- C. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.

1. Depth: 2-1/2 inches (64 mm), 4 inches (102 mm) and 6 inches (152 mm) as indicated on the Partition Type Drawing.
2. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
- D. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches (51 mm) long and matching studs in depth.
  1. Minimum Base-Metal Thickness: Matching steel studs.
- E. Room-Side Finish: As indicated.
- F. Shaft-Side Finish: Gypsum shaftliner board, moisture- and mold-resistant Type X.
- G. Insulation: Sound attenuation blankets.

## 2.3 PANEL PRODUCTS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Gypsum Shaftliner Board, Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with paper faces.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Lafarge North America, Inc.; Firecheck Type X Shaftliner.
    - b. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner.
    - c. USG Corporation; Sheetrock Brand Gypsum Liner Panel.
    - d. American Gypsum; Shaft Liner.
  2. Thickness: 1 inch (25.4 mm).
  3. Long Edges: Double bevel.
- C. Gypsum Shaftliner Board, Moisture- and Mold-Resistant Type X: ASTM C 1396/C 1396M; manufacturer's proprietary fire-resistive liner panels with moisture- and mold-resistant core and surfaces.
  1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Lafarge North America, Inc.; Firecheck Moldcheck Type X Shaftliner.
    - b. National Gypsum Company; Gold Bond Brand Fire-Shield Shaftliner XP.
    - c. USG Corporation; Sheetrock Brand Mold Tough Gypsum Liner Panel.
  2. Thickness: 1 inch (25.4 mm).
  3. Long Edges: Double bevel.
  4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- D. Gypsum Board: As specified in Section 092900 "Gypsum Board."

## 2.4 NON-LOAD-BEARING STEEL FRAMING

- A. Steel Framing Members: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  1. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.

## 2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with manufacturer's written recommendations.

- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes as specified in Section 092900 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written recommendations for application indicated.
- C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
- D. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
  - 1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing according to ASTM E 488 conducted by a qualified testing agency.
  - 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing according to ASTM E 1190 conducted by a qualified testing agency.
- E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from slag wool, or rock wool; Provide mineral-fiber SAFB.
- F. Acoustical Sealant: As specified in Section 079200 "Sealants."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install gypsum board shaft wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and ASTM C 754 other than stud-spacing requirements.
- B. Do not bridge building expansion joints with shaft wall assemblies; frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, wall-mounted door stops, and similar items that cannot be supported directly by shaft wall assembly framing.

1. Reinforcing: Where handrails directly attach to gypsum board shaft wall assemblies, provide galvanized steel reinforcing strip with 0.033-inch (0.84-mm) minimum thickness of base metal (uncoated), accurately positioned and secured behind at least one layer of face panel.
- D. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- E. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- F. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect while maintaining fire-resistance rating of gypsum board shaft wall assemblies.
  1. Install control joints on 30 foot maximum centers, for all partitions, at locations indicated, and as detailed. Align control joints with door frames wherever possible, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.
- G. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.
- H. Cant Panels: At projections into shaft exceeding 4 inches (102 mm), install 1/2- or 5/8-inch- (13- or 16-mm-) thick gypsum board cants covering tops of projections.
  1. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches (610 mm) o.c. with screws fastened to shaft wall framing.
  2. Where steel framing is required to support gypsum board cants, install framing at 24 inches (610 mm) o.c. and extend studs from the projection to shaft wall framing.
- I. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

### 3.3 IDENTIFICATION

- A. Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:
  1. Be located in accessible concealed floor, floor-ceiling or attic spaces.
  2. Be repeated at intervals not exceeding 30 feet (914 mm) measured horizontally along the wall or partition.
  3. Include lettering not less than 0.5 inch (12.7 mm)) in height, incorporating the followings wording: "FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS," or other wording to reflect the wall type as indicated on the Code Summary Drawings.

### 3.4 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092116.23

## **SECTION 092216 - NON-STRUCTURAL METAL FRAMING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

#### **1.2 ACTION SUBMITTALS**

- A. Product Data:** For each type of product.

### **PART 2 - PRODUCTS**

#### **2.1 DESCRIPTION**

- A. Fire-Test-Response Characteristics:** For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies:** For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

#### **2.2 FRAMING SYSTEMS**

- A. Framing Members, General:** Comply with ASTM C 754 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized, unless otherwise indicated.
- B. Studs and Runners:** ASTM C 645. EQ studs not permitted.
1. Steel Studs and Runners:
    - a. Minimum Base-Metal Thickness: 0.0296 inch, 30 mils.
    - b. Depth: As scheduled on Drawings for each location.
- C. Slip-Type Head Joints:** Provide one of the following:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs

- friction fit into top runner and with continuous cold rolled channel bridging attached to each stud located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
  3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
    - a. Products: Subject to compliance with requirements, provide one of the following:
      - 1) ClarkDietrich; MaxTrak Slotted Deflection Track
      - 2) Steel Network Inc. (The); VertiClip SLD Series.
      - 3) Telling Industries; True-Action™ Slotted Track.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.033 inch, 33 mil.
- E. Cold-Rolled Channel Bridging and Bracing: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: 1-1/2 inches (38 mm) unless otherwise indicated.
  2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm).
  2. Depth: 7/8 inch (22.2 mm) unless otherwise indicated.
- G. Resilient Furring Channels: 1/2-inch- (13-mm-) deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical.
- H. Cold-Rolled Furring Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
1. Depth: 3/4 inch (19 mm) unless otherwise indicated.
  2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch (0.8 mm).
  3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

## 2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
- B. Hanger Attachments to Concrete:
  - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
    - a. Type: Postinstalled, chemical anchor or postinstalled, expansion anchor.
  - 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25 by 5 mm) by length indicated.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.053 inch (1.34 mm) and minimum 1/2-inch- (13-mm-) wide flanges.
  - 1. Depth: 1-1/2 inches (38 mm) unless otherwise indicated on Drawings.
- F. Furring Channels (Furring Members):
  - 1. Cold-Rolled Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges, 3/4 inch (19 mm) deep.
  - 2. Steel Studs and Runners: ASTM C 645.
    - a. Minimum Base-Metal Thickness: 0.018 inch, 18 mil.
    - b. Depth: As indicated on Drawings.
  - 3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch (22 mm) deep.
    - a. Minimum Base-Metal Thickness: 0.018 inch, 18 mil.
  - 4. Resilient Furring Channels: 1/2-inch- (13-mm-) deep members designed to reduce sound transmission.
    - a. Configuration: Asymmetrical or hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
  - 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. Armstrong World Industries, Inc.; Drywall Grid Systems.

- b. Chicago Metallic Corporation; Drywall Grid System.
- c. USG Corporation; Drywall Suspension System.

## 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
  - 1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
  - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.
- C. Pre-compressed Spring Hangers for Sound Isolation: Resilient hangers shall have sufficient capacity to sustain continuously applied ceiling weight without settling after initial deflection. The isolation hanger shall be a combination high-deflection steel spring in series with a resilient, molded neoprene noise and vibration isolation pad. The steel spring and neoprene pad shall be incorporated into a stamped steel hanger assembly that resiliently supports the isolated ceiling. The hanger assembly bracket shall be designed to allow fifteen (15) degrees of vertical alignment of the suspension member without making metal-to-metal contact between the suspension and hanger assembly members. The hanger bracket shall be designed with an integral spring pre-load bracket selected to minimize change in elevation once a load is applied to the hanger and to hold the isolator assembly steady during attachment of gypsum board. The hanger assembly bracket shall consist of a leveling rod with an attached channel carrier designed to accept 1-1/2" x 1/2", 16-gauge cold-rolled steel. The isolation hanger deflection shall be selected by the manufacturer to provide a maximum natural frequency of 4.4 Hz. The steel spring element shall have a minimum Kx to Ky of 1 at its 1" rated deflection.
  - 1. Basis of Design Product: Mason Industries Model ICW or equal.
- D. Perimeter Isolation Material for Sound Isolation: Isolation material shall be 3/8" thick perimeter isolation board adhered to non-isolated structure. Model SRP shall not be penetrated by nail, screw, or similar fastener. Model SRP shall be.
  - 1. Basis of Design Product: Mason Industries Model SRP or equal.
  - 2. Location of Use: Where non-isolated building components abut resiliently suspended ceilings using spring hangers. Resiliently-suspended ceiling shall be constructed against Model SRP. Model SRP shall be sealed using resilient, non-hardening caulk.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
  - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
  - 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
  - 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

### 3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
  - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
- E. Cutting, Notching and Boring Holes in Nonstructural Steel Wall Framing:
  - 1. Flanges and lips of nonstructural steel wall studs shall not be cut or notched.

2. Holes in webs of nonstructural steel wall studs shall be permitted along the centerline of the web of the framing member, shall not exceed 1-1/2 inches (38 mm) in width or 4 inches (102 mm) in length, and the holes shall not be spaced less than 24 inches (610 mm) center to center from another hole or less than 10 inches (254 mm) from the bearing end.

### 3.4 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
  1. Space studs at 16 inches (406 mm) o.c. unless otherwise indicated.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
  1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
  5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
  6. Curved Partitions:
    - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches (150 mm) o.c.

- D. Install steel studs used as furring with clip angles at midpoint of wall span. Install additional clips to limit deflection to L/240 for walls finished with gypsum wall board and L/360 for walls finished with tile or plaster when subject to 5 psf (239 Pa) lateral load.
- E. Direct Furring: Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- F. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

### 3.5 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Isolate suspension systems from building structure to provide sound dampening using spring hangers where indicated on Drawings.
- D. Suspend hangers from building structure as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
    - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
  - 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  - 5. Do not attach hangers to steel roof deck.
  - 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  - 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.

- 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- E. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

## **SECTION 092900 - GYPSUM BOARD**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Interior gypsum board.
2. Cement board.
3. Sound-attenuation blankets

**B. Related Requirements:**

1. Section 092216 "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.
2. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.

#### **1.2 ACTION SUBMITTALS**

**A. Product Data:** For each type of product.

**B. Samples:** For the following products:

1. Trim Accessories: Full-size sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

#### **1.3 QUALITY ASSURANCE**

**A. Mockups:** Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:
  - a. Each level of gypsum board finish indicated for use in exposed locations.
2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### **1.4 DELIVERY, STORAGE AND HANDLING**

**A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.**

## 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

### 2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### 2.3 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. CertainTeed Corp.
  - 2. Georgia-Pacific Gypsum LLC.
  - 3. Lafarge North America Inc.
  - 4. National Gypsum Company.
  - 5. USG Corporation.
- B. Gypsum Wallboard: ASTM C 1396/C 1396M.
  - 1. Thickness: 5/8 inch.
  - 2. Where drawings indicate regular type 5/8 inch (15.9 mm), provide 5/8 inch (15.9 mm) Type X indicated below.
  - 3. Long Edges: Tapered.

- C. Gypsum Board, Type X: ASTM C 1396/C 1396M.
  - 1. Thickness: 5/8 inch (15.9 mm).
  - 2. Long Edges: Tapered.
- D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces, in 5/8 inch thickness unless otherwise indicated, with tapered edges; panels shall be classified as Type X
  - 1. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
  - 2. Products: Subject to compliance with requirements, provide one of the following or equal:
    - a. National Gypsum Company; Type XP/PR
    - b. United States Gypsum Co.; Mold Tough
- E. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M.
  - 1. Core: 5/8 inch (15.9 mm), Type X.
  - 2. Long Edges: Tapered.
  - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
  - 4. Performance Data:
    - a. Surface Abrasion: ASTM C1629. Classification Level 2
    - b. Surface Indentation: ASTM C1629. Classification Level 1
    - c. Soft-body Impact Test: ASTM C1629. Classification Level 1
  - 5. Products: Subject to compliance with requirements, provide one of the following or equal:
    - a. Protecta AR 100 Type X with Mold Defense; Lafarge North America Inc.
    - b. ProRoc Gypsum Board Panels; Certainteed, Division of BPB.

## 2.4 SPECIALTY GYPSUM BOARD

- A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability.
  - 1. Products: Subject to compliance with requirements, provide one of the following or equal:
    - a. CertainTeed Corp.; ProRoc Type C.
    - b. Lafarge North America Inc.; Firecheck Type C.
    - c. National Gypsum Company; Gold Bond Fire-Shield C.
    - d. USG Corporation; Firecode C Core.
  - 2. Thickness: 5/8 inch (15.9 mm), unless otherwise indicated.
  - 3. Long Edges: Tapered.
  - 4. Provide where required by UL Design or NER 258.

## 2.5 CEMENT BOARD

- A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corp.; FiberCement BackerBoard.
    - b. Custom Building Products; Wonderboard.

- c. James Hardie Building Products, Inc.; Hardiebacker 500.
- d. National Gypsum Company, Permabase Cement Board.
- e. USG Corporation; DUROCK Cement Board.
2. Thickness: 5/8 inch.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

## 2.6 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
  1. Material: Galvanized-coated steel sheet or rolled zinc
  2. Shapes:
    - a. Cornerbead.
    - b. Bullnose bead.
    - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - d. L-Bead: L-shaped; exposed long flange receives joint compound.
    - e. Expansion (control) joint.
    - f. Curved-Edge Cornerbead: With notched or flexible flanges.
- B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Fry Reglet Corp.
    - b. Gordon, Inc.
    - c. Pittcon Industries.
  2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
  3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified

## 2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  1. Interior Gypsum Board: Paper.
  2. Cement Board: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
  1. Prefilling: At open joints, beveled panel edges, and damaged surface areas, use setting-type taping compound.
  2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use factory mixed drying-type, all-purpose compound.
    - a. Use setting-type compound for installing paper-faced metal trim accessories.
  3. Fill Coat: For second coat, use factory mixed drying-type, all-purpose compound.
  4. Finish Coat: For third coat, use setting-type, sandable topping compound.

5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

- D. Joint Compound for Cement Board: As recommended by manufacturer.

## 2.8 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
  1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
  2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
  1. Fire-Resistance-Rated Assemblies: Provide mineral-fiber SAFB where required by the UL assembly.
- E. Acoustical Joint Sealant: As specified in Section 079200 "Joint Sealants"
- F. Gaskets for Sealing Dryer to Gypsum Board Partition Gap: Pre-coated, pre-compressed, primary seal for rapid installation into small vertical and horizontal joints.
  1. Basis of Design Product: Colorseal-On-A-Reel (COR) by Emseal, a Sika company.
  2. Color: As selected by Architect.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
  - 1. Refer to Section 079200 for additional requirements.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  - 1. Type X: Vertical and ceiling surfaces unless otherwise indicated.
  - 2. Ceiling Type: Ceiling surfaces.
  - 3. Abuse-Resistant Type: Corridor walls.
  - 4. Moisture- and Mold-Resistant Type: As indicated on Drawings.
  - 5. Type C: Where required for specific fire-resistance-rated assembly indicated.
- B. Single-Layer Application:
  - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
  - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
  - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:
  - 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
  - 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
  - 3. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

### 3.4 APPLYING CEMENT BOARD

- A. Cementitious Backer Units: ANSI A108.11, at showers, tubs, and where indicated.
- A. Where cement board backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

### 3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
  - 1. Install control joints on 30 foot maximum centers, for all partitions, at locations indicated, and as detailed. Align control joints with door frames wherever possible, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels.
  - 2. Install control joints at 50 foot maximum centers, with areas not to exceed 2,500 sq. ft. for all ceiling areas, at locations indicated, and as detailed.
- C. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners unless otherwise indicated.
  - 2. Bullnose Bead: Use where indicated.
  - 3. LC-Bead: Use at exposed panel edges.
  - 4. L-Bead: Use where indicated.
  - 5. Curved-Edge Cornerbead: Use at curved openings.
- D. Aluminum Trim: Install in locations indicated on Drawings.

### 3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Panels that are substrate for tile.
  - 3. Level 4: At all panel surfaces that will be exposed to view unless otherwise indicated.
  - 4. Level 5: Provide Level 5 finish at all areas where wall washed lighting is indicated, under wallcoverings, at surfaces scheduled to receive gloss paint, and elsewhere specifically indicated on Drawings and schedules.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

### 3.7 IDENTIFICATION

- A. Fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling. Such identification shall:
  - 1. Be located in accessible concealed floor, floor-ceiling or attic spaces.
  - 2. Be repeated at intervals not exceeding 30 feet (914 mm) measured horizontally along the wall or partition.
  - 3. Include lettering not less than 0.5 inch (12.7 mm)) in height, incorporating the followings wording: "FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS," or other wording to reflect the wall type as indicated on the Code Summary Drawings.

### 3.8 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

## **SECTION 093100 - CERAMIC TILING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Porcelain tile
2. Trim and edge accessories.

B. Related Work Specified Elsewhere:

1. Division 01 Section "Mockups" for large scale mockup of bathrooms.
2. Sealing of expansion, contraction, control, and isolation joints in tile surfaces is specified in Division 07 Section "Joint Sealant."

#### **1.2 ACTION SUBMITTALS**

A. Product data for each type of product specified.

B. Samples of each color of tile, grout, or accessory to be provided, for verification purposes.

#### **1.3 INFORMATIONAL SUBMITTALS**

A. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, plus other information specified.

#### **1.4 QUALITY ASSURANCE**

A. Single-Source Responsibility for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

B. Single-Source Responsibility for Setting and Grouting Materials: Obtain ingredients of a uniform quality from one manufacturer for each cementitious and admixture component and from one source or producer for each aggregate.

C. Installer Qualifications: Engage an experienced Installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.

D. Unit Mock-up: Provide mock-up on a board min. 2' x 2' in size, one for each different tile and grout color to be provided in the work; for final approval of grout color before ordering grout.

- E. In-Place Mock-up: Prepare mock-ups of types indicated below following requirements of this section. Reprepare mock-ups as many times as required by Architect until satisfactory result is obtained, as judged solely by Architect. Obtain Architect's approval of visual qualities before proceeding with work. Protect approved mock-ups until all work has been completed. Approved mock-ups will represent the minimum standard of acceptability for each portion of the work.

1. Provide in-place mock-up of wall tile in the large scale room mock-up specified in Division 01 "Mockups."

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

#### 1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.
- C. Maintain temperatures at 50 deg F (10 deg C) or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Basis-of-Design Manufacturers: The design for each tile type and other material specified is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the following manufacturers:
1. Tile:
    - a. American Olean; Div. of Dal-Tile International Corp
    - b. Creative Materials Corp.
    - c. Crossville Inc
    - d. Daltile; Div. of Dal-Tile International Inc.
    - e. Garden State Tile

- f. Olympia Tile
  - g. Florida Tile Industries, Inc.
  - h. Mirage Granito Ceramico Spa (Mirage USA)
  - i. MileStone
  - j. Provenza (distributed by Stone Source)
  - k. Stonepeak
  - l. Summitville Tiles, Inc.
  - m. United States Ceramic Tile Company
  - n. Floor Gres Ceramiche (distributed by Stone Source)
2. Mortars and Grouts:
- a. Bostik Construction Products Div. (Hydroment)
  - b. Laticrete International Inc.
  - c. Mapei Corp.
  - d. TEC Specialty Construction Brands Inc..
3. Termination, Trim and Transition Strips: Schluter

## 2.2 PRODUCTS, GENERAL

- A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.
1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.
- B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
- 1. Match color, texture, and pattern indicated by reference to manufacturer's standard designations for these characteristics.
  - 2. Provide tile trim and accessories that match color and finish of adjoining flat tile.
- D. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

## 2.3 TILE PRODUCTS

- A. Porcelain Wall Tile WT1 and WT2: Colored body porcelain tile, with the following requirements:

1. Module Size: 6" x 12"
2. Thickness: 10 mm
3. Edges: Pressed
4. Finish: Glossy
5. Surface: Textured
6. Colors: As scheduled
7. Basis of Design Product: "Exhale" from Emser Tile, or equal.
8. Installation Pattern: As indicated on Drawings.
9. Mortar Color(s): As selected by Architect for each location.

B. Ceramic Wall Tile WT3: Ceramic tile with the following requirements:

1. Module Size: 2" by 8".
2. Thickness: 0.3125 mm
3. Finish: Glossy
4. Color: As scheduled.
5. Basis of Design Product: "Metro" by Nemo Tile and Stone, or equal.
6. Installation Pattern: As indicated on Drawings.
7. Mortar Color: As selected by Architect

## 2.4 SETTING MATERIALS

A. Latex-Portland Cement Mortar: Two component mortar system, comply with ANSI A118.4. Provide one of the following, or approved equal:

1. Laticrete 317 with Laticrete 333 additive; Laticrete International, Inc.
2. Kerabond with Keralastic; Mapei Corp.
3. Or equivalent.

## 2.5 GROUTING MATERIALS

A. Water-Cleanable Epoxy Grout: ANSI A118.3. with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24). Grout shall be stain resistant, color fast, mold and mildew inhibiting, non-sag, suitable for joints 1/16" to 1/2" and sanded type suitable for installing with glazed tiles.

1. Basis of Design Product: Laticrete "Spectralock Pro Epoxy Grout" or equal.
2. Colors: As scheduled, or if not scheduled, as selected by Architect.

## 2.6 MISCELLANEOUS MATERIALS

A. Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8-inch wide at top edge with integral provision for anchorage to mortar bed or substrate unless otherwise indicated.

B. Termination, Trim and Transition Strips: Provide Schluter units as scheduled, or indicated on Drawings.

1. Provide Jolly in classic grey in public toilet rooms with WT-2
  2. Provide Jolly in matte white in resident's toilet room with WT-1
- C. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by tile manufacturer for applications indicated.
- D. Grout Release: Product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
1. Mapei "UltraCare Grout Release".
  2. Miracle Sealants Co. "511 Impregnator"
- E. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- F. Grout Sealers: Water-based sealer for tile for protection from stains, as follows:
1. Mapei "UltraCare Grout Sealer".
  2. Miracle Sealants Co. "511 Impregnator"

## 2.7 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and areas where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
1. Verify that substrates for setting tile are firm, dry, clean, and free from oil or waxy films and curing compounds.
  2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Comply with manufacturer's installation specifications to prepare substrates indicated to receive tile.
- B. Use trowelable leveling and patching compounds per manufacturer's directions to fill cracks, holes, and depressions in substrates as required to provide suitable substrate for tile application.
- C. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

### 3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.
- B. TCNA Installation Guidelines: TCNA "Handbook for Ceramic Tile Installation"; comply with TCNA installation methods indicated.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.
  - 1. Cut and grind tile edges where they abut curved surfaces to produce a close and uniform abutting joint.
- E. Jointing Pattern: Lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.
- F. Tile Patterns: Comply with pattern indicated on drawings.
- G. Expansion Joints: Provide expansion joints, control joints and pressure relieving joints of widths and at locations as per TCNA Handbook Construction #EJ171. Do not saw cut joints after installation of tiles.

1. Sealing of joints is included in Division 07 Section "Joint Sealers."

- H. Apply grout release to tile surfaces prior to grouting. Prepare a small mock-up area of grout release application for Architect's approval before proceeding with application of grout release to installed tile surfaces.
- I. Grout tile to comply with ANSI A108.10.

### 3.4 WALL INSTALLATION METHODS

- A. Wall Tile: Install tile to comply with requirements indicated below for setting-bed methods, TCNA installation methods related to subsurface wall conditions, and grout types:
  1. Gypsum Board or Cement Board- TCNA W243, and as follows:
    - a. Bond Coat for Tile: Latex-portland cement mortar, ANSI A108.5 over gypsum board or cement board
    - b. Grout: Epoxy
- B. Joint Widths:
  1. WT1 and WT2: 1/8"
  2. WT3: 1/16".

### 3.5 CLEANING AND PROTECTION

- A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  1. Remove grout residue from tile as soon as possible.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 093100

## **SECTION 095113 - ACOUSTICAL PANEL CEILINGS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes interior ceilings consisting of:
  - 1. Mineral-based acoustical panels and exposed suspension systems..
- B. Related Sections include the following:
  - 1. Acoustical sealants are specified in Division 07 Section "Joint Sealants"

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product specified
- B. Coordination Drawings: Reflected ceiling plans drawn to scale and coordinating penetrations and ceiling-mounted items. Show the following:
  - 1. Ceiling suspension members.
  - 2. Method of attaching hangers to building structure.
  - 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
  - 4. Minimum Drawing Scale: 1:100
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on samples of size indicated below.
  - 1. 6-inch- (150-mm-) square samples of each acoustical panel type, pattern, and color.
  - 2. Set of 12-inch- (300-mm-) long samples of exposed suspension system members, including moldings, for each color and system type required.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: Indicate compliance of acoustical panel ceilings and components with requirements based on comprehensive testing of current products.
- B. Research/Evaluation Reports: Evidence of acoustical panel ceiling's and components' compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
- C. Maintenance Data: For finishes to include in maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels and suspension system components to Project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges, soiling panels or damaging units in any way.

#### 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

#### 1.7 COORDINATION

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

#### 1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Acoustical Ceiling Components: 2% of each type of panel installed, rounded up to the nearest whole box or carton, but not less than 2 boxes of each type..

### PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
  - 1. Surface-Burning Characteristics: Acoustical panels shall meet the requirements of ASTM E84 for Class A flame spread and smoke developed.

## 2.2 MANUFACTURERS

- A. Basis of Design Products: Subject to compliance with requirements, provide specified products by Armstrong World Industries or equivalent products by one of the following:
  - 1. CertainTeed
  - 2. USG Interiors.

## 2.3 ACOUSTICAL PANELS

- A. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
  - 1. Mounting Method for Measuring Noise Reduction Coefficient: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.
- B. Acoustical Panels for Acoustical Panel Ceiling C2: Where this designation is indicated, provide panels complying with the following:
  - 1. Classification: Panels fitting ASTM E 1264 for Type IV, wet-formed mineral fiber with membrane-faced overlay; Form 2, water felted.
  - 2. Pattern: Panels fitting ASTM E 1264 pattern designation (description) E (lightly textured).
  - 3. Color: White.
  - 4. Light Reflectance Coefficient: 0.85
  - 5. Noise Reduction Coefficient: 0.85
  - 6. Ceiling Attenuation Class: 35
  - 7. AC: 170
  - 8. Fire Rating: Class A
  - 9. Sag Resistance Treatment: Armstrong HumiGuard Plus
  - 10. Anti-Mold and Mildew Treatment: BioBlock+
  - 11. VOC: GREENGUARD Gold Certified low VOC emissions
  - 12. Warranty: 30 year
  - 13. Edge Detail: Square tegular.
  - 14. Thickness: 1 inch.
  - 15. Size: 24 by 24 inches.
  - 16. Basis of Design Product: Armstrong CALLA #2822, or equal.

C. Acoustical Panels for Acoustical Panel Ceiling C3: Where this designation is indicated, provide panels complying with the following:

1. Classification: Panels fitting ASTM E 1264 for Type IV, wet-formed mineral fiber with membrane-faced overlay; Form 2, water felted.
2. Pattern: Panels fitting ASTM E 1264 pattern designation (description) E (lightly textured).
3. Color: White.
4. Light Reflectance Coefficient: 0.85
5. Noise Reduction Coefficient: 0.80
6. Ceiling Attenuation Class: 38
7. AC: 170
8. Fire Rating: Class A
9. Sag Resistance Treatment: Armstrong HumiGuard Plus
10. Anti-Mold and Mildew Treatment: BioBlock+
11. VOC: GREENGUARD Gold Certified low VOC emissions
12. Warranty: 30 year
13. Edge Detail: Square tegular.
14. Thickness: 1 inch.
15. Size: 24 by 24 inches.
16. Basis of Design Product: Armstrong CALLA Health Zone #2231, or equal.

## 2.4 METAL SUSPENSION SYSTEMS

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.

B. Suspension System for Acoustical Panel Ceiling C2 and C3: Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z120) coating designation, with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges; other characteristics as follows:

1. Structural Classification: Intermediate-duty system.
2. End Condition of Cross Runners: Override (stepped) or butt-edge type, as standard with manufacturer.
3. Face Design: Flush face.
4. Cap Material: Steel sheet.
5. Cap Finish: Manufacturer's standard factory-applied painted finish in white.
6. Basis of Design Product: Armstrong Prelude XL, or equal.

C. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

1. 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 hangers of type indicated, and with capability

to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
  - 1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
  - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.
- E. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish and color as that used for exposed flanges of suspension system runners.

## 2.5 ACOUSTICAL SEALANT

- A. Refer to Division 07 Section "Joint Sealants".

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and other conditions affecting performance of acoustical panel ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other ceiling anchors whose installation is specified in other Sections.
- B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

### 3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
- B. Suspend ceiling hangers from building's structural members and as follows:
  1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
  4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure; that are appropriate for substrate; and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  5. Do not attach hangers to steel deck tabs.
  6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  7. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches (200 mm) from ends of each member.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
  1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
  2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3 mm in 3.6 m). Miter corners accurately and connect securely.
  3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Install acoustical panels with undamaged edges and fitted accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
  1. Arrange directionally patterned acoustical panels as indicated on reflected ceiling plans.

### 3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

## **SECTION 096500 - RESILIENT FLOORING AND ACCESSORIES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Homogeneous slip-resistant sheet vinyl flooring (VF-1) with integral base (VB-1) and shower transition (TS-2).
2. Luxury vinyl tile flooring (LVT-1).
3. Rubber wall base (RB-1).
4. Resilient flooring accessories.

B. Related Work Specified Elsewhere:

1. Division 01 Section "Mockups" for large scale mockup of bathrooms.
2. Division 220000 "Plumbing" for floor drain in bathrooms.

#### **1.2 ACTION SUBMITTALS**

A. Product data for each type of product specified.

B. Samples for verification purposes in form of actual flooring or sections of accessories for each color and pattern specified.

1. For heat-welding bead, manufacturer's standard-size samples, but not less than 9 inches (230 mm) long, of each color specified.

C. Shop Drawings: Indicate decorative pattern layout, if any. Show location of seams and edges. Indicate location of columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutout locations.

#### **1.3 INFORMATIONAL SUBMITTALS**

A. Maintenance data for resilient flooring and accessories.

#### **1.4 QUALITY ASSURANCE**

A. Installer Qualifications: Engage an installer who is competent in the technique required by sheet flooring manufacturer for heat-welding seams, and who has been trained by sheet flooring manufacturer to install their products.

- B. Single-Source Responsibility for Floor Tile and Accessories: Obtain each type, color, and pattern of tile and accessory from a single source; all stair accessories shall be from one manufacturer.
- C. Single-Source Responsibility for Sheet Flooring and Accessories: Obtain each type, color, and pattern of sheet floor covering specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- D. In-Place Mock-up: Prepare mock-ups of types indicated below following requirements of this section. Reprepare mock-ups as many times as required by Architect until satisfactory result is obtained, as judged solely by Architect. Obtain Architect's approval of visual qualities before proceeding with work. Protect approved mock-ups until all work has been completed. Approved mock-ups will represent the minimum standard of acceptability for each portion of the work.
  - 1. Provide in-place mock-up of sheet flooring, including all transitions, flashing and sealing to floor drain, and integral base in the large scale room mock-up specified in Division 01 "Mockups."

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient materials on flat surface in dry space protected from the weather with ambient temperatures maintained between 50 deg F (10 deg C) and 90 deg F (32 deg C)..
- B. Store rolls of sheet flooring upright.
- C. Move floor coverings and installation accessories into spaces where they will be installed at least 48 hours before installation, unless longer conditioning periods are recommended in writing by manufacturer.

#### 1.6 PROJECT CONDITIONS

- A. Maintain a minimum temperature of 70 deg F (21 deg C) in spaces to receive resilient flooring for at least 72 hours prior to installation, during installation, and for not less than 72 hours after installation. After this period, maintain a temperature of not less than 55 deg F (13 deg C).
- B. Moisture Testing of Concrete Substrates: Perform moisture tests recommended by manufacturer and as follows:
  - 1. Testing Procedures: Perform calcium chloride or moisture meter tests as required by floor topping and resilient tile manufacturers.
    - a. Calcium Chloride Testing: Anhydrous calcium chloride test, ASTM F 1869.
    - b. Moisture Meter Testing: Relative humidity test using in situ probes, ASTM F 2170.

2. Proceed with installation only after substrates do not exceed maximum moisture-vapor-emission rate or relative humidity level measurement acceptable to flooring material manufacturer.

- C. Do not install flooring or accessories until they are at the same temperature as the space where they are to be installed.

- D. Close spaces to traffic during flooring installation.

## 1.7 SEQUENCING AND SCHEDULING

- A. Install flooring and accessories after other finishing operations, including painting, have been completed.

## 1.8 EXTRA MATERIALS

- A. Extra Materials: Furnished from same production run as resilient flooring installed. Package materials with protective covering and identify with labels describing contents. Deliver extra materials to Owner.

1. Furnish 5% extra materials of sheet floor covering.
2. Furnish 2 boxes of each type and color of material provided in the work.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire Performance Characteristics: Provide resilient flooring with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Critical Radiant Flux: 0.45 watts per sq. cm or more per ASTM E 648.
2. Smoke Density: Less than 450 per ASTM E 662.

- B. Sustainability Requirements: Resilient flooring shall comply with RFCI FloorScore Program.

- C. Resilient flooring shall not contain PVC, plasticizers, ortho-phthalates, halogens, asbestos, or Red List Chemicals of Concern.

### 2.2 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the Work include, but are not limited to, the following:

1. Tiles and Sheet:
  - a. Armstrong World Industries
  - b. Altro
  - c. Mannington
  - d. Mohawk Group
  - e. Nora systems
  - f. Patcraft
  - g. Shaw Hard Surface
  - h. Tarkett
2. Base and Other Accessories:
  - a. Endura
  - b. Flexco
  - c. Roppe
  - d. Johnsonite

## 2.3 RESILIENT TILE FLOORING

- A. Luxury Vinyl Tile (LVT-1): Luxury vinyl tile complying with ASTM F1700, Class III, Type B and as follows:
1. Size: 9.845" x 39.38" (25 cm x 1 m)
  2. Thickness: 4.5mm
  3. Wear Layer Thickness: 22 mil
  4. Finish: Ceramor
  5. Colors: As scheduled.
  6. Basis of Design Product: Textured Woodgrains from Level Set Collection by Interface, or equal.
  7. Installation: As indicated on Drawings

## 2.4 RESILIENT SHEET FLOORING

- A. Homogeneous Slip-Resistant Sheet Vinyl Flooring (VF-1): High performance slip-resistant homogeneous sheet vinyl flooring with fiberglass reinforcement backing, meeting ASTM F1303, Type 1, Grade 1, Class A, safety flooring.
1. Roll Width and Length: 6'-7"w by 65'-5"l.
  2. Total Thickness and Wear Layer Thickness: 2.0mm (0.08") homogeneous
  3. Static Coefficient of Friction: 0.88 dry and 1.03 wet per ASTM D2047.
  4. Dynamic Coefficient of Friction: 0.65 wet DCOF per ANSI/NFSI B101.3
  5. Finish: Altro EasyClean
  6. Backing: Non-woven polyester/cellulose, glass-fiber reinforcement
  7. Installation Method: Direct glue

8. Warranty: 10 years
9. Basis of Design Product: Altro Aquarius by Altro, or equal.
10. Color: AQI2026 Anchovy.

## 2.5 RESILIENT WALL BASE

- A. Rubber Wall Base (RB-1): ASTM F 1861, Type TP, Group 2, 6" high, 1/8" thick, smooth surface, and as follows:
1. Style: Straight (toeless) style for all carpeted areas and cove base with toe (set-on type) elsewhere
  2. Lengths: 48" lengths.
  3. Inside and Outside Corners: Preformed.
  4. Basis of Design Products: Johnsonite Traditional Rubber Wall Base by Tarkett, or equal
  5. Colors: As scheduled.

## 2.6 MISCELLANEOUS RESILIENT ACCESSORIES

- A. Rubber Accessory Moldings: Provide rubber accessory molding complying with the following:
1. Product Description: Carpet edge for glue-down applications, carpet nosing, nosing for resilient tile, reducer strip for resilient flooring, and tile and carpet joiner.
  2. Profile and Dimensions: As indicated or required.
  3. Colors: As scheduled.
- B. Vinyl Safety Flooring Transition Trim: Vinyl (PVC) transition trim designed to be heat welded into the adjacent safety flooring, ADA compliant, 4.75" wide long (2.35" visible after heat welding) with a protruding height of 0.12".
1. Basis of Design Product: Altro Shower Transition Trim, or equal.
  2. Color: Match flooring.

## 2.7 INSTALLATION ACCESSORIES

- A. Concrete Slab Primer: Nonstaining type as recommended by flooring manufacturer.
- B. Concrete Sealer: Type recommended and approved by resilient flooring manufacturer and adhesive manufacturer to ensure proper adhesion of resilient flooring to substrate.
- C. Trowelable Underlayments and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- D. Adhesives: Products supplied by resilient flooring and accessory manufacturers, of type recommended to suit resilient products and substrate conditions.

- E. Heat-Welding Bead: Solid-strand product of floor covering manufacturer for heat-welding seams.
  - 1. Color and Pattern: Match color and pattern of sheet floor covering.
- F. Accessories for Integral Coved Base at Sheet Vinyl:
  - 1. Cap Strip: Vinyl or stainless steel as recommended by manufacturer for applications indicated, and sized to suit applications.
  - 2. Cove Former: Sized as required.
- G. Floor Polish: Type recommended by flooring material manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. General: Examine areas where installation of flooring will occur, with Installer present, to verify that substrates and conditions are satisfactory for flooring installation and comply with flooring manufacturer's requirements and those specified in this Section.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
  - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond tests recommended by flooring manufacturer.
  - 2. Finishes of subfloors comply with tolerances and other requirements specified in Division 03 Section "Cast-In-Place Concrete" for slabs receiving resilient flooring.
  - 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.
- C. Concrete Moisture Emission Tests: Perform calcium chloride test or moisture meter test as per manufacturer's directions, as follows, and other tests if recommended by resilient flooring and adhesive manufacturer:
  - 1. Perform moisture test at rate of one per 2,000 sq.ft. of new and existing floor area to be covered.
  - 2. Report test results in writing to Architect, and Contractor within 24 hours after tests are completed. Reports of concrete moisture emission tests shall contain the Project identification name and number, date of test location of test within structure.
  - 3. Perform additional moisture emission tests of in-place concrete when test results indicate specified moisture content has been exceeded, as directed by Architect.

- a. Repeat test one week after initial test minimally and additionally repeat test if required by field conditions to determine moisture levels in area of resilient flooring application.
- D. Do not proceed with installation until unsatisfactory conditions have been corrected.
- E. Only if it is not possible to provide a concrete substrate with acceptable moisture levels, then a surface applied moisture mitigation system shall be used that meets the requirements of ASTM F3010 Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.

### 3.2 PREPARATION

- A. General: Comply with manufacturer's installation specifications to prepare substrates indicated to receive flooring.
- B. Use trowelable leveling and patching compounds per flooring manufacturer's directions to fill cracks, holes, and depressions in substrates and to patch and level floors as required to provide suitable substrate for flooring application.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives by using a grinder, sander, or polishing machine with a heavy-duty wire brush.
- D. Broom or vacuum clean substrates to be covered by flooring immediately before installation of flooring. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.
- E. Apply concrete slab primer, if recommended by flooring manufacturer, prior to applying adhesive. Apply according to manufacturer's directions.
- F. Seal concrete substrates as required by moisture test results to ensure proper adhesion of resilient flooring to substrate.

### 3.3 SHEET FLOORING INSTALLATION

- A. General: Comply with sheet floor covering manufacturer's written installation instructions.
- B. Unroll sheet floor coverings and allow them to stabilize before cutting and fitting, if recommended in writing by manufacturer.
- C. Lay out sheet floor coverings to comply with the following requirements:
  - 1. Maintain uniformity of sheet floor covering direction.
  - 2. Arrange for a minimum number of seams and place them in inconspicuous and low-traffic areas, and not less than 6 inches (150 mm) away from parallel joints in flooring substrates.

3. Match edges of sheet floor coverings for color shading and pattern at seams according to manufacturer's written recommendations.
  4. Avoid cross seams.
- D. Scribe, cut, and fit sheet floor coverings to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- E. Extend sheet floor coverings into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install sheet floor coverings on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.
- H. Adhere sheet floor coverings to flooring substrates to comply with floor covering manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
1. Produce completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Mechanically fasten sheet floor covering in place at drains with surface membrane clamping plumbing fixtures in accordance with manufacturer's directions.
- J. Heat-Welded Seams: Rout joints and heat weld with welding bead, permanently fusing sections into a seamless floor covering. Prepare, weld, and finish seams according to manufacturer's written instructions and ASTM F 1516 to produce surfaces flush with adjoining floor covering surfaces.
- K. Hand roll sheet floor coverings in both directions from center out to embed floor coverings in adhesive and eliminate trapped air. At walls, door casings, and other locations where access by roller is impractical, press floor coverings firmly in place with flat-bladed instrument.
- L. Extend sheet flooring up wall to height as indicated on drawings to form integral base and terminate in wall cap as per manufacturer's directions.

### 3.4 TILE INSTALLATION

- A. General: Comply with tile manufacturer's installation directions and other requirements indicated that are applicable to each type of tile installation included in Project.

- B. Lay out tiles from center marks established with principal walls so tiles at opposite edges of room are of equal width. Install tiles square with room axis, unless otherwise indicated.
- C. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles in decorative pattern as indicated on drawings.
- D. Scribe, cut, and fit tiles to butt tightly to vertical surfaces and edgings.
- E. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.
- H. Adhere tiles to flooring substrates without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed tile installation.
- I. Use full spread of adhesive applied to substrate in compliance with tile manufacturer's directions including those for trowel notching, adhesive mixing, and adhesive open and working times.
- J. Hand roll tiles where required by tile manufacturer.

### 3.5 INSTALLATION OF WALL BASE AND ACCESSORIES

- A. General: Install resilient accessories according to manufacturer's written installation instructions.
- B. Apply resilient wall base to walls, pilasters, casework, and other permanent fixtures in rooms and areas where base is required. Install wall base in lengths as long as practicable. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
  - 1. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
  - 2. Install preformed corners as per manufacturer's directions.

- C. Place resilient accessories so they are butted to adjacent materials of type indicated and bond to substrates with adhesive. Install reducer strips at edges of flooring that otherwise would be exposed.

### 3.6 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing installation:
  - 1. Remove visible adhesive and other surface blemishes using cleaner recommended by manufacturers.
  - 2. Sweep or vacuum floor thoroughly.
  - 3. Do not wash floor until after time period recommended by resilient flooring manufacturer.
  - 4. Damp-mop flooring to remove black marks and soil.
- B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by flooring manufacturer.
  - 1. Apply protective floor polish to flooring surfaces that are free from soil, visible adhesive, and surface blemishes. Coordinate selection of floor polish with Owner's maintenance service requirements.
  - 2. Cover flooring with undyed, untreated building paper until inspection for Substantial Completion.
- C. Clean flooring not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean flooring using method recommended by manufacturer.
  - 1. Strip protective floor polish that was applied after completing installation prior to cleaning.
  - 2. Reapply floor polish after cleaning.

END OF SECTION 096500

## **SECTION 096813 - TILE CARPETING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section includes:**

1. Installation of Owner-Furnished modular carpet tile.

**B. Related Requirements:**

1. Division 09 Section "Resilient Flooring and Accessories" for resilient wall base and accessories installed with carpet tile.

#### **1.2 PREINSTALLATION MEETINGS**

**A. Preinstallation Conference:** Conduct conference at Project site

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
  - a. Review delivery, storage, and handling procedures.
  - b. Review ambient conditions and ventilation procedures.
  - c. Review subfloor preparation procedures.

#### **1.3 ACTION SUBMITTALS**

**A. Product Data:** For each type of product.

**B. Shop Drawings:** Show the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Type of subfloor.
3. Type of installation.
4. Pattern of installation.
5. Type, color, and location of edge, transition, and other accessory strips.
6. Transition details to other flooring materials.

#### **1.4 INFORMATIONAL SUBMITTALS**

**A. Qualification Data:** For Installer.

#### **1.5 QUALITY ASSURANCE**

- A. Installer Qualifications:** An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

- B. Mockups: Before installing carpet tile, install mockups for each type of carpet tile installation required to demonstrate aesthetic effects and qualities of materials and execution. Install mockups to comply with the following requirements, using materials indicated for the completed Work:
1. Install mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
  2. Notify Architect seven days in advance of dates and times when mockups will be installed.
  3. Demonstrate the proposed range of aesthetic effects and workmanship.
  4. Obtain Architect's approval of mockups before starting work.
  5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  6. Remove mockups when directed.
  7. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion..

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI Carpet Installation Standard 2011.
- B. Store carpeting per manufacturer's recommendations for allowable temperature and humidity range. Products shall not be allowed to become damp.
- C. Remove carpeting from packaging and store in unoccupied, ventilated areas (100% outside air supply, minimum of 1.5 air changes per hour, no recirculation) for 24-72 hours prior to installation. Carpeting shall not be stored with materials which have high emissions of VOCs or other contaminants. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders

#### 1.7 FIELD CONDITIONS

- A. Comply with CRI Carpet Installation Standard 2011 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

## PART 2 - PRODUCTS

### 2.1 CARPET TILE

- A. Furnished by Owner.

### 2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.
- D. Carpet Edge Guard: Refer to Division 09 Section "Resilient Flooring and Accessories."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
  - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer. Do not install flooring if subfloor moisture emission rate exceeds indicated amounts.
    - a. Calcium Chloride Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed the maximum moisture-vapor-emission rate acceptable to flooring manufacturer.

- b. Moisture Meter Testing: Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have relative humidity level measurement acceptable to flooring material manufacturer.
- c. Testing Procedures
  - 1) Where flooring is indicated to be applied to structural concrete topping or concrete slab-on-grade substrates, perform moisture meter tests.
  - 2) Where flooring is indicated to be applied to areas where hydraulic cement topping is installed, perform calcium chloride or moisture meter tests as required by topping manufacturer.
- 2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet tile.
- 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Comply with CRI Carpet Installation Standard 2011, Section 7, "Site Conditions; All Installations," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with CRI Carpet Installation Standard 2011, Section 18, "Modular Carpet," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.

- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders, unless otherwise indicated.

### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI Carpet Installation Standard 2011, Section 20, "Protecting Indoor Installations."
  - 1. Restrict traffic over adhesive installations for a minimum of 48 hours to allow proper adhesive cure.
  - 2. Restrict exposure to water from cleaning or other sources for a minimum of 30 days.
  - 3. If required to protect the finished floor covering from dirt or paint, or if additional work is to be done after the installation, cover carpeting with a non-staining building material paper.
  - 4. Protect the installation from rolling traffic by using sheets of hardboard or plywood in affected areas.
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

## SECTION 099100 - PAINTING

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint and stain systems on the following interior and exterior substrates:
  - 1. Steel and iron.
  - 2. Galvanized metal.
  - 3. Gypsum board.
  - 4. Wood
- B. Related Sections include the following:
  - 1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.

#### 1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of topcoat product indicated.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
  - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
  - 2. Step coats on Samples to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  - 2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

#### 1.3 QUALITY ASSURANCE

- A. MPI Standards: Maintain copy of this standard at the Project site at all times.

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
  2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
- B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
    - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft.
    - b. Other Items: Architect will designate items or areas required.
  2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
  3. Final approval of color selections will be based on benchmark samples.
    - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.
- 1.4 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 (7 deg C).
1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.
- 1.5 PROJECT CONDITIONS
- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints 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.
- C. Do not apply paints 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.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.
2. PPG Architectural Finishes, Inc.
3. Sherwin-Williams Company

## 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 of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the OTC (Ozone Transport Commission) restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
4. Floor Coatings: VOC not more than 100 g/L.
5. Shellacs, Clear: VOC not more than 730 g/L.
6. Shellacs, Pigmented: VOC not more than 550 g/L.
7. Flat Topcoat Paints: VOC content of not more than 50 g/L.
8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
10. Floor Coatings: VOC not more than 100 g/L.
11. Shellacs, Clear: VOC not more than 730 g/L.
12. Shellacs, Pigmented: VOC not more than 550 g/L.
13. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
14. Dry-Fog Coatings: VOC content of not more than 400 g/L.
15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.
17. Fire Retardant Paint: VOC content of not more than 60 g/L.

### C. Colors: As scheduled. Colors listed are for color matching purposes only.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Gypsum Board: 12 percent.
  - 2. Wood: 15 percent
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
  - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that 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 if any.
  - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- F. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

- G. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
1. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
  2. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and backsides of wood, including cabinets, counters, cases, and paneling.
  3. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
  4. When transparent finish is required, backprime with spar varnish or polyurethane.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
1. Use applicators and techniques suited for paint and substrate indicated.
  2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. Application Procedures: Apply paints and coatings by brush or roller according to the manufacturer's directions, except as noted below. Spray application is not permitted for trim, ceilings and walls, unless specifically approved by Architect in advance for each individual situation. Roller application on woodwork is not permitted.
1. 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.
  2. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
  3. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
- C. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- D. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

- E. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- F. 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.
- G. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
  - 1. Mechanical Work:
    - a. Uninsulated metal piping.
    - b. Uninsulated plastic piping.
    - c. Pipe hangers and supports.
    - d. Tanks that do not have factory-applied final finishes.
    - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
    - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
  - 2. Electrical Work:
    - a. Switchgear.
    - b. Panelboards.
    - c. Electrical equipment that is indicated to have a factory-primed finish for field painting.

### 3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
  - 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
  - 2. Testing agency will perform tests for compliance with product requirements.
  - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

### 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 Architect, 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. General: Provide listed products or equal products of other named manufacturers in Part 2.
- B. Zinc-Coated (Galvanized) Metal: Full-gloss, acrylic latex enamel finish - 2 coats - self-priming.
  - 1. Prime Coat: Gloss acrylic latex enamel paint; MPI # 114, X-Green 114, 154, X-Green 154, 164, LEED 2009, LEED V4.
    - a. Benjamin Moore Ultra Spec D.T.M. Acrylic Gloss Enamel HP28
  - 2. Top Coat: Gloss acrylic latex enamel paint; MPI # 114, X-Green 114, 154, X-Green 154, 164, LEED 2009, LEED V4.
    - a. Benjamin Moore Ultra Spec D.T.M. Acrylic Gloss Enamel HP28

### 3.7 INTERIOR PAINTING SCHEDULE

- A. General: Provide listed products or equal products of other named manufacturers in Part 2.
- B. Gypsum Board Ceilings: Eggshell acrylic finish.
  - 1. Prime Coat: Latex-based, interior primer; MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified.
    - a. Benjamin Moore; Ultra Spec 500 Interior Latex Primer N534
  - 2. Intermediate Coat and Topcoat: Low-luster (eggshell or satin), acrylic-latex, interior enamel; MPI # 52, X-Green 52, 145, X-Green 145, 139, X-Green 139, LEED 2009 LEED V4, CHPS Certified.
    - a. Benjamin Moore; Ultra Spec 500 Interior Latex Eggshell T538.
- C. Gypsum Drywall Walls: Semi-gloss, acrylic finish.

1. Prime Coat: Latex-based, interior primer; MPI # 50, X-Green 50, 149, X-Green 149, LEED 2009, LEED V4, CHPS Certified.
    - a. Benjamin Moore; Ultra Spec 500 Interior Latex Primer N534
  2. Intermediate Coat and Topcoat: Semigloss acrylic-latex, interior enamel; MPI # 43, X-Green 43, 146, X-Green 146, 140, X-Green 140, LEED 2009, LEED V4, CHPS Certified.
    - a. Benjamin Moore; Ultra Spec 500 Latex Semigloss N539.
- D. Hollow Metal Doors, Frames, and Sidelights, and Ferrous Metals: Semigloss, acrylic-enamel finish.
1. Prime Coat: Rust-Inhibitive Primer (Water Based), MPI #107, X-Green 107, 134, LEED 2009, CHPS Certified.
    - a. Benjamin Moore; Super Spec HP Acrylic Metal Primer P04.
  2. Intermediate Coat and Topcoat: Factory-formulated semigloss acrylic-latex enamel for interior application; MPI # 141, X-Green 141, 153, X-Green 153, LEED 2009, LEED V4.
    - a. Benjamin Moore; Ultra Spec HP D.T.M. Acrylic Semi-Gloss Enamel, HP29
- E. Stained Wood and Woodwork: Satin, waterborne clear acrylic urethane over stain.
1. Stain Coat: Penetrating wood stain, water-based; MPI # 186 LEED Credit.
    - a. Lenmar (Benjamin Moore); Waterborne Interior Wiping Stain 1WB.1300 (240 g/L)
  2. Intermediate Coat and Topcoat: Satin, interior waterborne clear acrylic urethane varnish; MPI # 121, 128.
    - a. Lenmar (Benjamin Moore); Waterborne Aqua-Plastic Urethane Satin, 1WB.1427 (335 g/L)

END OF SECTION 099100

## **SECTION 101400 - SIGNAGE**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes the following:
  - 1. Panel signs.
  - 2. Adhesive vinyl signs for application to glass.
  - 3. Signage accessories

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.
- B. Shop Drawings: Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.
  - 1. Provide message list for each sign, including large-scale details of wording, lettering, and braille layout.
- C. Samples for Initial Selection: For each type of sign material indicated that involves color selection.
  - 1. Panel Signs: Samples of each finish type and color, on not less than 4-inch squares of plastic material, showing the full range of colors available
- D. Samples for Verification: For each type of sign, include the following Samples to verify color selected:
  - 1. Panel Signs: Full-size Samples of each type of sign required.
  - 2. Approved samples will be returned for installation into Project.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer.
- B. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

#### **1.4 QUALITY ASSURANCE**

- A. **Installer Qualifications:** An employer of workers trained and approved by signage manufacturer.
- B. **Source Limitations:** Obtain each sign type through one source from a single manufacturer.
- C. **Regulatory Requirements:** Comply with ANSI A.117.1 - 2017 and with code provisions as adopted by authorities having jurisdiction.
  - 1. **Interior Code Signage:** Provide signage as required by accessibility regulations and requirements of authorities having jurisdiction. These include, but are not limited to, the following:
    - a. Room Capacity.
    - b. Elevator Signs.
    - c. Stairway Identification.
    - d. Signs for Accessible Spaces.

## 1.5 COORDINATION

- A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.
  - 1. For signs supported by or anchored to permanent construction, furnish templates for installation of anchorage devices.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. **Available Manufacturers:** Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
  - 1. **Manufacturers of Panel Signs:**
    - a. ASE (Architectural Signs and Engraving) Manufacturing.
    - b. Mohawk Sign Systems.
    - c. Tactile Signage Inc.

### 2.2 PANEL SIGNS

- A. **General:** Provide signs that comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.
  - 1. Produce sign surfaces constructed to remain flat under installed conditions within tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally.
  - 2. Sign materials shall meet a Class A finish.

- B. Interior Panel Signs: Sand carved 1/8 inch (3.1 mm) thick melamine plastic. Provide lettering, graphics and background materials in custom colors to match Owner's existing signage, as approved by Architect.

1. Produce smooth, even, level sign surfaces, constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.58 mm) measured diagonally.
2. Lettering and Braille Content: Provide uppercase letters raised 1/32 inch (.79 mm), and grade 2 braille for each specific location. Minimum text height: 5/8 inch (15.8 mm).
3. Pictograms: Provide graphics raised 1/32 inch (.79 mm), with minimum 6 inch (152.4 mm) high background field, and lettering and braille written description directly below.
4. Lettering Style: Match existing.
5. Copy Location: Centered.
6. Corners and Edges: Radius corners and square edges.
7. Product: One of the following:
  - a. "Blast Etched Melamine Series 100" by ASE (Architectural Signs and Engraving) Manufacturing.
  - b. Series 200A, Sand Carved by Mohawk Sign Systems.
  - c. Melamine Graphic Blast by Tactile Signage Inc
8. Provide specified signage as scheduled.

## 2.3 PANEL ACCESSORIES

1. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides; 3M "VHB Heavy Duty Mounting Tape" or equal.
2. Adhesive: As recommended by sign manufacturer.
3. Mechanical Fasteners: Stainless steel screws.

## 2.4 VINYL LETTERING/GRAPHICS FOR INSTALLATION ON GLAZING

- A. Provide vinyl graphics for mounting on glass panel as scheduled.

1. Graphic Content: As scheduled.
2. Font: As selected by Architect.
3. Letter/Symbol Size: As selected by Architect
4. Color: As scheduled.

## 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 work.
- B. Verify that items, including anchor inserts, provided under other sections of Work are sized and located to accommodate signs.
- C. Examine supporting members to ensure that surfaces are at elevations indicated or required to comply with authorities having jurisdiction and are free from dirt and other deleterious matter.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Locate interior wall signs and accessories where indicated, in accordance with ANSI A.117.1 - 2017 and with code provisions as adopted by authorities having jurisdiction, using mounting methods of the type described and in compliance with the manufacturer's instructions.
  - 1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
  - 2. Mount signs on wall adjacent to the latch side of door, unless otherwise indicated. Where there is no wall space to the latch side of the door, including at double leaf doors, mount sign on the nearest adjacent wall as approved by the Architect. Mount signs at 48-inches (1219 mm) from the baseline of the lowest characters to the finished floor.
  - 3. Locate signs to allow approach within 3-inches (75 mm) of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Panel Signs and Directories: Attach signs to wall surfaces using methods indicated below:
  - 1. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
  - 2. Double Sided Tape: Apply to back of sign, peel off protective covering and press firmly to wall in desired location
- C. Glass-Mounted Panel Signs: Provide backer panel that matches color and size of panel sign and adhere to glass surface. Mount panel signs to backer panel using self-adhesive methods.
- D. Vinyl Signs mounted to Glass: As scheduled below.

### 3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

### 3.4 INTERIOR SIGN SCHEDULE

- A. Typical Restroom Sign

- 1. Restroom Symbols - ADA and toilet
- 2. "Restroom"
- 3. Room Number
- 4. Braille

- B. Other Rooms (Study Lounge, Kitchen, Laundry)

- 1. Room Name
- 2. Room Number
- 3. Braille

- C. Vinyl for windows

- 1. Room numbers only
- 2. Adhesive on front of sign (designed to be applied to inside of windows facing out)
- 3. White background with highly reflective black letters/numbers

- D. Vinyl for above doors

- 1. Same as for windows above except for adhesive on back (to be mounted inside bathroom above door)

- E. Elevator safety signage at Landings

- 1. "IN FIRE EMERGENCY, DO NOT USE ELEVATOR. USE EXIT STAIRS", ½" high

END OF SECTION 101400

## **SECTION 102600 - WALL AND DOOR PROTECTION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Wall protection system
2. Corner guards.

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: Include physical characteristics for each wall and door protection system component indicated.
- B. Samples for initial selection purposes of each type and color available for wall panels and molding accessory required of size indicated below:
1. 3 inch square sample of each wall panel specified.
  2. 6-inch long sample of each molding accessory.
- C. Shop Drawings: Show locations, extent, and installation details of each wall and door protection system component. Show methods of attachment to adjoining construction.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Product certificates signed by wall panel manufacturer certifying materials furnished comply with specified requirements.
- B. Certified test reports showing compliance with requirements for fire performance characteristics and physical properties.
- C. Maintenance Data: For each wall and door protection system component to include in maintenance manuals specified in Division 01. Include the following:
1. Precautions for use of cleaning materials and methods that could be detrimental to finishes and performance.

#### **1.4 QUALITY ASSURANCE**

- A. Source Limitations: Obtain each type of wall and door protection units through one source from a single manufacturer.
- B. Fire Performance Characteristics: Provide wall panels with the following surface burning characteristics as determined by testing identical products per ASTM E 84 by UL or other

testing and inspecting organizations acceptable to authorities having jurisdiction. Identify wall panels with appropriate markings of applicable testing and inspecting organization.

1. Flame Spread: 25 or less.
2. Smoke Developed: 450 or less.

- C. Installer Qualifications: Arrange for installation of wall panels by a firm that can demonstrate successful experience in installing similar in type and quality to those required for this Project.

## 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store wall and door protection materials in original undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

## 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install wall and door protection components until the space is enclosed and weatherproof and ambient temperature within the building is maintained at not less than 70 deg F (21 deg C) for not less than 72 hours before beginning installation.
- B. Field Measurements: Where units are indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering wall and door protection products that may be incorporated into the Work include, but are not limited to, the following:
1. Altro
  2. Duralight Plastics
  3. Duramax PVC Panels.
  4. Palram Americas.
  5. Inpro

### 2.2 WALL PROTECTION SHEETS

- A. PVC Wall Panels: Semi-rigid sheet wall protection system made from extruded PVCu homogeneous sheet and matching trim and joint strips.

1. Panel Size: 4' x 9' or 4' x 10' as required
2. Panel Thickness: .080" (2 mm)
3. Surface Texture: Pebble
4. Color: Sea Salt.
5. Basis of Design Product: Altro Puraguard Wall Protection by Altro, or equal.

B. Accessories: Provide inside corner, outside corner, joint strips, division molding and edge trim moldings by same manufacturer, matching wall panels.

C. Adhesive: Manufacturer's standard low odor, VOC compliant, non-flammable latex based adhesive for use and substrate.

D. Sealant: Manufacturer's standard silicone sealant meeting local VOC requirements.

## 2.3 CORNER GUARDS

A. Clear Plastic Corner Guards: Clear corner guards shall be extruded from clear thermo plastic material; 2 1/2" x 2 1/2" x .100" thickness, height as indicated on Drawings. Provide angle as required based on field conditions. Provide adhesive backed units.

1. Basis of Design Product: Clear Corner Guards by Inpro or equal.

## 2.4 FABRICATION

A. General: Fabricate wall and door protection systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including thicknesses of components.

B. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine areas and conditions in which wall and door protection system components and materials will be installed.

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

### 3.2 PREPARATION

A. Complete finishing operations, including painting, before installing wall and door protection system components.

- B. General: Before installation, clean substrate to remove dust, debris, and loose particles.
- C. Acclimate wall panels to room temperature for 48 hours prior to installation.
- D. Follow manufacturer's printed instructions for surface preparation for wall panels.

### 3.3 INSTALLATION

- A. General: Install wall and door protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
  - 1. Install wall and door protection units in locations and at mounting heights indicated on Drawings.
- B. Do not use materials that are unsound, warped, bowed or twisted.
- C. Install wall panels plumb, level, true, and aligned with adjacent materials.
  - 1. Scribe and cut panels to fit adjoining work.
  - 2. Install to tolerance of 1/32 inch in 8 feet for plumb and level.
  - 3. Coordinate with materials and systems that may be in or adjacent to panels. Provide cutouts for mechanical and electrical items that penetrate.
- D. Plan wall panel layout, balancing panel sizes at corners.
  - 1. Adhere division molding and work from center of wall to corners.
  - 2. Adhere wall panels to substrate in accordance with manufacturer's written instructions.
  - 3. Stagger joints between panels and substrate material.
  - 4. Provide moldings at all sides of panels. Adhere ceiling line and curb moldings in place with sealant, and provide sealant in molding channels prior to insertion of panels.
  - 5. Remove excess sealant from panel surfaces immediately.

### 3.4 ADJUSTING AND CLEANING

- A. Repair damaged or defective wall panels where possible to eliminate functional or visual defects. Where not possible to repair, replace wall panels.
- B. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.
- C. Use cleaning methods recommended by the wall panel manufacturer.
- D. Replace panels that cannot be cleaned.

### 3.5 PROTECTION

- A. Provide final protection and maintain conditions that ensure wall panels are without damage or deterioration at time of Substantial Completion.

END OF SECTION 102600

## SECTION 102800 - TOILET AND BATH ACCESSORIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. This Section includes the following:

1. Washroom accessories.
2. Mirrors.
3. Warm air dryers
4. Shower accessories.
5. Installation of Owner furnished washroom accessories

#### 1.2 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. Features that will be included for Project.
5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated on Contract Drawings.
2. Identify products using designations indicated on Contract Drawings.

C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals, including replaceable parts and service recommendations.

#### 1.3 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

B. Inserts and Anchorages: Furnish accessory manufacturer's standard inserts and anchoring devices that must be set in concrete or built into masonry. Coordinate delivery with other work to avoid delay.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

## 1.4 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.

## 1.5 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Fifteen (15) years from date of Substantial Completion.

# PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Basis-of-Design Products: The design for toilet accessories is based on certain named equipment. Subject to compliance with requirements, provide the named product or an equivalent product by one of the following:
  - 1. A & J Washroom Accessories, Inc.
  - 2. American Dryer, Inc.
  - 3. American Specialties, Inc.
  - 4. Bradley Corporation.
  - 5. Bobrick Washroom Equipment
  - 6. Excel Dryer Corporation.
  - 7. World Dryer Corporation

## 2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch (0.8-mm) (22-gage) minimum nominal thickness, unless otherwise indicated.
- B. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch (0.9-mm) (20-gage) minimum nominal thickness.
- C. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- D. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

- E. 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.
- F. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.
- H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

## 2.3 GRAB BARS

- A. Grab Bars; Stainless Steel Type: Provide grab bars with wall thickness not less than 18 gage (1.27 mm thick), concealed mounting with snap lock covers, satin finish, 1-1/2-inch (38.1 mm) clearance between wall surface and inside face of bar, outside diameter of 1-1/4 inches (32 mm); Bobrick Series B-5806, dimensions and configurations as indicated on Contract Drawings.

## 2.4 WARM-AIR DRYERS

- A. Warm-Air Hand Dryer, ADA Compliant: Surface mounted type; infrared optical sensor activation; one piece stainless steel cover; stainless steel wall mounting plate; adjustable sound, speed and heat control; automatic shutoff after 35 seconds if hands are not removed, motor/blower (1/2 hp / high 30,000 rpm and low 20,000 rpm) provides air velocity of 16,000lfm at the outlet and 7,000 lfm at the hands. Voltage required: 110-120 VAC, 7-7.7 amp, 770-915 watt, 650/0 Hz, single phase; UL/c-UL listed and labeled.
  - 1. Color: Brushed stainless steel cover.
  - 2. Basis of Design Product: Excel Dryer Model TA-SB Thin Air, or equal.
  - 3. Warranty: 5 years.

## 2.5 MIRROR UNITS

- A. Frameless Polished Plate Glass Mirror Units: 1/4" thick polished plate glass with polished edges. For surface mounting.
  - 1. Basis of Design Product: ASI Model #8287, or equal.
  - 2. Sizes:
    - a. F-1: 24"
    - b. F-2: 20".
- B. Stainless Steel Framed Mirror Units with Shelf: Fabricate frame from 1/2 by 1/2 by 3/8 inch channel shapes with square corners mitered, welded, and ground smooth, from satin-finished stainless. Shelf shall be fabricated from 18-gauge stainless steel with satin finish, with hemmed return edge on front; mirror shelf meets accessible design by protruding 4" from the wall. Provide shock absorbing strips and perimeter frame and for

full size of back, with galvanized steel back, concealed wall hanger and theft-proof fasteners.

1. Basis of Design Product: Bobrick B-166, or equal.
2. Sizes: As indicated on Drawings.

## 2.6 SHOWER ACCESSORIES

- A. Shower Curtain Rod, Heavy-Duty: Type-304, 20-gauge stainless steel with satin finish and an outside diameter of 1". Flanges shall be 1-3/8" diameter chrome-plated plastic with bright polished finish. Unit shall be equipped with concealed mounting brackets.

1. Basis of Design Product: Bobrick B-207, or equal.
2. Length: As indicated on Drawings for each location.

- B. Shower Seat: Seat shall be constructed of 5/16" thick, one piece, solid phenolic, semi-gloss laminate white colored top and bottom and shall have black edges. Frame, support legs, flanges and bracket are type 304 satin finished stainless steel. Guide bracket shall control seat lowering into operating position. Seat measures 33" wide and 20" wide and projects 14-1/2" from wall. Unit shall support up to 500 lbs when properly installed.

1. Basis of Design Products: ASI Folding Shower Seat Model #8203-33 (33") and #8203-20 (20") or equal.

## 2.7 HOOKS

- A. Double Robe Hook: Heavy-duty polished finish chrome plated zinc double hook with 3" wide curved T-bar forming hook, projects 2-7/8" from wall; round wall bracket with backplate for concealed mounting.

1. Basis of Design Product: Moen Arlys Double Robe Hook Model Y5703, or equal.

## 2.8 TOWEL BARS AND RINGS

- A. Towel Ring: Chrome plated zinc ring is 6-5/16" diameter and wall mounted bracket has 2-1/8" diameter. Provide Moen Arlys Towel Ring Model Y5785 or equal.

- B. Towel Bar: stainless steel bar and chrome plated zinc posts; provide 18" and 24" long bars. Provide Moen Arlys Towel Bar Model Y5718 and Y5724, or equal.

## 2.9 SHELF

- A. Glass Shelf: Rectangular tempered glass shelf 20"l x 4"w mounted on two wall-mounted brackets, Provide Gatco Bleu Glass Shelf Item 716 or equal.

## 2.10 OTHER WASHROOM ACCESSORIES

- A. All other washroom accessories indicated on Drawings shall be furnished by Owner. Install all Owner-furnished washroom accessories.

## 2.11 FABRICATION

- A. General: No names or labels are permitted on exposed faces of toilet and bath accessory units. On either interior surface not exposed to view or on back surface, provide identification of each accessory item either by a printed, waterproof label or a stamped nameplate indicating manufacturer's name and product number
- B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide anchorage that is fully concealed when unit is closed.
- D. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six (6) keys to Owner's representative.

## 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. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, according to manufacturer's written instructions for type of substrate involved.
- C. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F 446, and in compliance with ADA Regulations.

### 3.2 ADJUSTING AND CLEANING

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

END OF SECTION 102800

## **SECTION 142600 - LIMITED-USE, LIMITED-APPLICATION ELEVATORS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes limited-use, limited-application elevators of the following types:
  - 1. Machine-room-less, electric traction elevators for commercial passenger use.
- B. Related Sections include the following:
  - 1. Division 05 Sections for the following:
    - a. Structural-steel shapes for subsills .
    - b. Pit ladders.
  - 2. Division 09 Sections for finish flooring in elevator cars.
  - 3. Division 26 Section for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.
  - 4. Division 26 Section for telephone service to elevators.
  - 5. Division 26 Sections for electrical service for elevators.

#### **1.2 DEFINITIONS**

- A. Defective Elevator Work: Operation or control system failures; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for the following:
  - 1. Car enclosures and hoistway entrances.
  - 2. Operation, control, and signal systems
- B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. . Include large-scale layout of car control station and standby power operation control panel. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.

1. Include wiring diagram detailing wiring for power, signal and control systems differentiating clearly between manufacturer-installed wiring and field-installed wiring. Indicate maximum and average power demands.

- C. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch- (75-mm-) square samples of sheet materials; and 4-inch (100-mm) lengths of running trim members.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, including emergency generator, as shown and specified, are adequate for elevator system being provided.
- B. Maintenance Manuals: Include operation and maintenance instructions, parts listing with sources indicated, recommended parts inventory listing, emergency instructions, and similar information. Include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel. Submit for Owner's information at Project closeout.
- C. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- D. Qualification Data: For Installer
- E. Warranty: Special warranty specified in this Section.

#### 1.5 MAINTENANCE SUBMITTALS

- A. Repair Requirements: For elevator microprocessor control system, provide maintenance diagnostic tools, electrical schematic wiring diagrams, and any access codes and passwords required for all maintenance functions, including diagnostics, adjustments, and parameter reprogramming. Tools may be hand held or built into the control system and shall function for the life of the equipment. Tools provided shall be usable throughout the life of the equipment without the requirement to return to the manufacturer. Provide complete operations and maintenance manuals including diagnostics instructions for troubleshooting the microprocessor system.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an experienced installer approved by elevator manufacturer who has completed elevator installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

- B. Regulatory Requirements: In addition to local governing regulations, comply with applicable provisions in ASME A17.1, "Safety Code for Elevators and Escalators" and Building Code of Maine.
- C. Accessibility Requirements: In addition to local governing regulations, comply with ANSI A117.1-2017.
- D. NFPA: Comply with applicable NFPA codes, and specifically with sections relating to electrical work and elevators.
- E. Fire-Rated Door Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252.
- F. Design Criteria: The drawings and specifications indicate the cab clear inside dimensions, motor horsepower and hoistway dimensional requirements and other requirements of the electric traction elevator, and are based on the specific types and models indicated. Electric traction elevators by other manufacturers may be considered, provided deviations in dimensions are minor, and do not change the hoistway dimensions. Motor horsepower must be less than or equal to that specified or the proposer shall pay all costs associated with increasing electrical service to elevator as necessary. The burden of proof of equality is on the proposer.
- G. As a part of final acceptance of the project, the Contractor shall have a Qualified Elevator Inspector (QEI) conduct a full Acceptance Inspection and Test in accordance with ASME/ANSI A17.1 before final acceptance by the Owner. The Contractor shall obtain from the elevator contractor and/or manufacturer and furnish to the Owner all data affecting the elevator installation or modification, including 'as-installed' circuit and control wiring diagrams and maintenance manuals.
- H. Installer shall review the structural shop drawings when submitted to the Architect for approval, and other information, to confirm that manufacturer's system will properly fit in the shaft be provided. Coordinate any corrective work with the steel erector prior to erection of the steel.

## 1.7 COORDINATION

- A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of other work relating to electric traction elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

## 1.8 WARRANTY

- A. Special Manufacturer's Warranty: Written warranty, signed by manufacturer agreeing to repair, restore, or replace defective elevator work within specified warranty period.

- 1. Warranty Period: 36 months from date of Acceptance.

## 1.9 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Acceptance, provide 12 months' full maintenance service by skilled employees of the elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies as used in the manufacture and installation of original equipment.
  - 1. Perform maintenance, during normal working hours.
  - 2. Provide emergency 24-hour callback service.
    - a. Response Time: Two hours or less.
- B. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.
- C. Prior to the end of the one-year maintenance service, jointly inspect the elevator with the Owner's maintenance vendor and perform any corrective work required.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Provide specified products of Savaria or equivalent elevators manufactured by KONE, Schindler or ThyssenKrupp.

### 2.2 MATERIALS AND COMPONENTS

- A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components, published by manufacturer as included in standard pre-engineered elevator systems and as required for a complete system.
  - 1. Provide machine-room-less type elevator.
- B. Basis of Design Elevator: Savaria Orion - MRL
  - 1. 1:1 counterweight traction with direct drive gearbox and safety gear. Using a 6 pole, 3 phase motor to reduce noise level. Direct acting 1:1 ratio on the sheave to

- eliminates rope run noise. The gearbox shall be mounted on nitrile anti-vibration mounts for further noise reduction. Roller guide shall be use on the cab sling and guide shoes on the counterweight to further reduce noise.
2. Duty cycle : 200 trips per day 45 max starts per hour.
- C. Limited Use Limited Application Elevator: The elevator described here, manufactured by Savaria Lifts Inc., is a LULA Elevator consisting of:
1. Rated Load: 1400 lb (635 kg)
  2. Rated Speed: 30 f.p.m. (nominal) (0.15 m/s)
  3. Travel: 23'-0" V.I.F.. Maximum of 25 feet (300 inches).
  4. Cab Configuration: Enter/exit same side.
  5. Car Platform Size: 42" W by 54" D (1067 mm by 1371 mm)
  6. Levels Serviced: 2
  7. Car Operation: Automatic.
  8. Power Supply: 208 Volt, 3 Phase, 30 Amps + 110 Volt, 15 amp, 1 Phase 60 Hz.
  9. Emergency Power: Battery operation in down direction
  10. Controller: PLC
  11. Manual Lowering: Outside the hoist way in machine room or via access hatch for MRL.
- D. Elevator Cab Design: Orion STD Car Enclosure: Steel or s/s wall construction
1. Cab Walls: Steel - Architectural White (standard)
  2. Ceiling Finish: Steel - Architectural White with four recessed incandescent down lights.
  3. Car doors and frames shall be 1 1/2 hour ULC Fire rated and 2 speed horizontally sliding. Door finish shall be powder coated Architectural white or black to match cab finish
  4. Handrail: A stainless steel single handrail, with 1-1/2 inch (38 mm) diameter rail shall be located on the control wall of the cab.
- E. Appendix E package including directional arrow and voice annunciator: Not required.
- F. Automatic Landing Doors: Landing doors and frames shall be 1 1/2 hour ULC Fire rated, 2 speed horizontally sliding with concealed mechanical interlock.
1. Door finish shall be primed powder coated grey (Standard)
- G. Car Operation:
1. Car Operating Panel shall consist of metal push bottoms with illuminated haloes, tactile identifications, emergency stop/alarm button, on/off key switch and emergency light mounted on a removable stainless steel panel (Type 304 #4 Stainless Steel Finish).
  2. Digital floor indicator and directional indicator in cab and at each landing.
  3. An ADA hands free phone will be supplied within car operating panel.

4. Emergency Operation - The car shall be equipped with a battery operated light fixture, emergency battery lowering device and alarm in case of normal building supply failure. The battery shall be the rechargeable type with an automatic recharging system. A manual lowering device shall be located outside the hoistway in the machine room.
5. Fire Service: Phase 1 fire recall service only (optional) - mandatory for 2010 A17.1 code.

H. Drive System: 2.1:1 counterweight traction with direct drive gearbox and safety gear.

1. Controller location: TRUE MRL with controller in door buck at landing level One.
2. Drive system and controller:
  - a. Motor: 6 pole 3 phase motor coupled to a 13:1 product specific gearbox to reduce noise level.
  - b. The drive unit shall incorporate the following features:
    - 1) Smooth stops at each landing.
    - 2) Emergency lowering by battery power
  - c. Guide rail system
    - 1) Steel 8lb per ft guide rails shall be used for guide rails and counterweight rails. Roller guide shall be used on the cab sling and guide shoes on the counterweight to further reduce noise
    - 2) Cable: Elevator traction cable 3 x 3/8" (10mm) DIA 8 x19 sealed with natural fiber core, regular lay. Minimum breaking strength 8,200 lb (3,727 kg) each.

I. Leveling Device:

1. The lift shall be provided with an anti-creep device which will maintain the carriage level within 1/2 inch (12 mm) of each landing.
2. All limit switch and leveling device switches shall be located in a position to be inaccessible to unauthorized persons.

J. Terminal Stopping Devices: Normal terminal stopping devices shall be provided at top and bottom of runway to stop the car positively and automatically.

K. Wiring: All wiring and electrical connections shall comply with applicable codes. Insulated wiring shall have flame-retardant and moisture-proof outer covering and shall be run in conduit or electrical wire ways if located outside the unit enclosure. Quick disconnect harnesses shall be used when possible.

## 2.3 SIGNAGE

- A. Provide signage complying with Safety Code for Elevators and Escalators (ASME A17.1), ANSI A117.1-2017, and the Building Code of Maine.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistways, hoistway openings, pits, and machine rooms as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance.

### 3.2 INSTALLATION

- A. Comply with manufacturer's written instructions.
  - 1. Install hoistway frames according to NFPA 80
- B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to minimize transmission of vibrations to structure and thereby minimize structure-borne noise from elevator system.
- D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
- E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with cars. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- F. Leveling Tolerance: 1/8 inch (3 mm), up or down, regardless of load and direction of travel.
- G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.

### 3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and governing regulations and agencies. All tests shall be witnessed by a qualified elevator inspector (QEI) retained by the Owner.

- B. Operating Test: Load elevators to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machines during 30-minute test period. Record failure of elevators to perform as required.
  - 1. Perform operating test specified above on one elevator of each type, capacity, speed, and travel distance.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

### 3.4 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operation, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of operational failure and other building emergencies. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete elevator maintenance program.
- B. Make a final check of each elevator operation with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.

### 3.5 PROTECTION

- A. Temporary Use: Do not use elevators for construction purposes unless cars are provided with temporary enclosures, either within finished cars or in place of finished cars, to protect finishes from damage.
  - 1. Provide full maintenance service by skilled, competent employees of elevator Installer for elevators used for construction purposes. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Use same parts and supplies as used in the manufacture and installation of original equipment.
  - 2. Provide protective coverings, barriers, devices, signs, and other procedures to protect elevators. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.
  - 3. Provide services of an elevator operator to operate the elevator during construction for construction purposes once temporary enclosures are in place. Cost of operator's services shall be borne by Contractor.

END OF SECTION 142600



## **SECTION 211313 - AUTOMATIC FIRE PROTECTION**

### **PART 1 GENERAL**

#### **1.1 DESCRIPTION OF WORK**

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to design, install and test modifications to the existing pressurized, fully supervised, wet pipe fire protection system for full building protection in accordance with NFPA, IBC, and the Owner's insurance underwriter. Areas subject to freezing shall have a dry pipe system, dry pendent or sidewall heads per NFPA.
- B. The building sprinkler system design shall be based on NFPA13 requirements.

#### **1.2 RELATED DOCUMENTS**

- A. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" are hereby made a part of the work of this section.
- B. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.
- C. Provision of waste management: Section 01 74 19, Construction Waste Management and Disposal.

#### **1.3 QUALIFICATIONS**

- A. The Fire Protection Work shall be performed by a qualified Contractor primarily engaged in the design and installation of Fire Protection Systems. The fire protection system design shall be performed under the direction of, and sealed by, a professional engineer registered in the State of Maine or with NICET Level III (minimum) Certification.
- B. Welding qualifications of individuals installing welded piping shall be certified by the National Certified Welding Bureau for the type(s) of weld(s) proposed for use in piping assembly.

#### **1.4 SUBMITTALS**

- A. Items for which the submittal requirements of section 23 05 00, Supplemental Mechanical General Requirements, apply are as Follows:
  - 1. Hydrant flow test.
  - 2. System components.
  - 3. Hydraulic calculations.
  - 4. Piping layout, details and control diagram.
  - 5. Flushing and testing records.

6. Certificate of installation.
7. Copy of Fire Protection Contractors License.
8. Welding certificates of individual welding technicians.
9. Sprinkler heads.
10. Alarm valve(s).
11. Fire department connection(s).
12. Firestopping materials and methods.

Submit hydrant flow test, equipment descriptive data, hydraulic calculations and system layout for review by the Owner's Insurance Underwriter. Submit the system layout to the Architect for review. The Architect's review will be limited to checking for conformance with the design concept of the project and general compliance with the contract documents and will in no way assume liability for review for compliance with codes, standards and laws.

- B. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- C. Product Data: Submit data on product characteristics, performance criteria and limitations.
- D. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

## 1.5 SPRINKLER COVERAGE

- A. Sprinkler head coverage shall conform with NFPA 13 requirements for the use of the building. Coverage shall be increased accordingly where required by the Authority having jurisdiction.
- B. If the requirements of the inspection agency or the Owner's insuring agent are more rigorous than those stated herein, then the more rigorous requirements shall govern.

## PART 2 PRODUCTS

### 2.1 SYSTEM COMPONENTS AND HARDWARE

- A. Pipe, Fittings, Joints, Hangers, Valves, Fire Department Connections, Alarms: Conform to NFPA 13, Installation of Sprinkler Systems.
- B. Sprinkler Heads:
  1. Interior Heated Spaces: Conform to NFPA 13, commercial quick response type. Provide semi-recessed type with white finish for acoustical tile ceilings. Sprinkler heads in GWB ceilings shall be "concealed" type. Dry pendent or sidewall heads, where required, may be standard response type.

2. Provide a spare head cabinet with wrenches, the amount of spare heads for each orifice size, finish, temperature classification, pattern and length furnished in the project shall be in accordance with the following schedule:

Sprinkler Heads on Project	Number of Spare heads of each type.
Less than 300	6
300-999	12
1000 or more	24

3. Provide head protection guards where required.
  4. Sprinkler heads in unheated areas shall be dry pendent or sidewall type, or served by a separate dry-pipe system.
- C. Fire Department Connection: Provide a Siamese or Storz connection (as verified with the local fire department) at a location coordinated with the local fire department and the Architect.

## 2.2 WATER SUPPLIES

- A. EXISTING

## 2.3 DEVICES

- A. Detection devices and associated wiring both within the fire protection system and to the building Fire Alarm System shall be the responsibility of the Sprinkler Contractor.

## 2.4 BACKFLOW PREVENTER

- A. EXISTING.

## 2.5 PIPING SYSTEM IDENTIFICATION

- A. Piping system and valve identification and color coding shall be in accordance with ANSI.

## 2.6 ELEVATOR SHAFTS AND MACHINE ROOM

- A. Sprinkler elevator shafts and elevator machine room per NFPA and the Maine State Elevator Code

## 2.7 CEILING CAVITIES

- A. Ceiling cavities above all suspended acoustical tile ceilings in corridor areas and certain other areas contain bundled electrical cables and individual wires and shall be sprinklered. Coordinate sprinkler requirements with the Electrical Drawings.

## 2.8 FLEXIBLE SPRINKLER HOSE FITTINGS

- A. Manufacturer: FlexHead Industries, Inc., Viking or Victaulic "Aquaflex".

1. Contact: 56 Lowland Street, Holliston, MA 01746; Telephone: (800) 829-6975; Fax: (508) 893-6020; Email: [sales1@flexhead.com](mailto:sales1@flexhead.com); website: [www.flexhead.com](http://www.flexhead.com)
- B. Description: Flexible Sprinkler Hose Fittings for use in commercial suspended ceilings and sheetrock ceilings.
  1. Regulatory Requirements:
    - a. In accordance with NFPA 13.
- C. Product Performance Criteria:
  1. FM Approved for its intended use pursuant to FM 1637 Approval Standard for Flexible Sprinkler Hose with Threaded End Fittings.
  2. UL Listed for its intended use pursuant to UL 2443 Standard for Flexible Sprinkler Hose with Fittings for Fire Protection Service.
  3. Seismically qualified for use pursuant to ICC-ES AC-156 Acceptance Criteria for Seismic Qualification by Shake-Table Testing of Nonstructural Components and Systems.
- D. Materials: FlexHead Commercial Sprinkler Connections.
  1. FlexHead Flexible Hose Assemblies and End Fittings:
    - a. Composition: 100% Type 304 Stainless Steel.
    - b. Straight Hose Assembly Lengths: 2ft length, Model #2024 or 3ft length, Model #2036.
      1.  $\frac{3}{4}$  inch outlet.
      2. 175 psi maximum rated pressure.
      3. Fully welded non-mechanical fittings, braided, leak-tested with minimum 1 inch true-bore internal corrugated hose diameter.
    - c. Elbow Hose Assembly Lengths (For use in confined spaces): 2ft length, Model #2024E or 3ft length, Model #2036E.
      1.  $\frac{3}{4}$  inch outlet.
      2. 175 psi maximum rated pressure.
      3. Fully welded non-mechanical fittings, braided, leak-tested with minimum 1 inch true-bore internal corrugated hose diameter.
  2. FlexHead Ceiling Bracket:
    - a. Composition: Type G90 Galvanized Steel.
    - b. Type: Direct attachment type, having integrated snap-on clip ends positively attached to the ceiling using tamper-resistant screws.
    - c. Flexible Hose Attachment: Removable hub type with set screw.
  3. Do not use product where exposed, concealed only.

## 2.9 SPRINKLER SYSTEM ZONING

### A. EXISTING

## PART 3 EXECUTION

### 3.1 PIPING LAYOUT AND DESIGN

- A. System requirements, installation requirements, design, plans, and calculations: Conform to NFPA 13, Installation of Sprinkler Systems.
- B. Sprinkler piping shall be run concealed above ceilings in occupied areas. Piping in other areas may be run exposed. Piping shall not be exposed in occupied spaces unless indicated on the drawings.
- C. Pipe penetrations through walls and floors shall be in accordance with Section 23 05 00 - Supplemental Mechanical General Requirements. Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy. Penetrations through walls shall be sleeved in accordance with Section 23 05 00. Sleeves shall be provided by the Fire Protection Contractor.
- D. Coordinate design and layout with building structure and building systems. The work shown in the contract documents has precedence for space requirements. Work of other trades may be modified or moved only with permission of the trade involved. Costs associated with modifications or relocations shall be the same as for "Substitutions" Section 23 05 00.
- E. Architect shall review proposed system layout and reserve the right to relocate heads, substitute head system and in general review final layout for components visible in occupied spaces.

### 3.2 SYSTEM ACCEPTANCE

- A. Approval, flushing, hydrostatic testing, instructions, and certificates of installation: Conform to NFPA 13, Installation of Sprinkler Systems.
- B. Disinfect the water piping in accordance with AWWA C601. Fill the piping systems with solution containing a minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Repeat disinfection if chlorine residual is less than 10 parts per million after 24 hours. Flush the solution from the systems with clean water until maximum residual chlorine contents is not greater than 0.2 parts per million.
- C. Closing in Work:
  - 1. General: Cover up or enclose work after it has been properly and completely reviewed.
  - 2. No additional cost to the Owner will be allowed for uncovering and recovering, work that is covered or enclosed prior to required review and acceptance.

D. Cleanup and Corrosion Prevention:

1. Upon completion of the work thoroughly clean and flush piping systems to the sewer with water.
2. Piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
3. Before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

E. Instructions: On completion of the project, provide a technician familiar with the system to thoroughly instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner.

F. Warranty: For a period of one (1) year after completion of the installation repair or replace any defective materials or workmanship. Upon completion of the installation, the system shall be turned over to the Owner fully inspected and tested, and in operational condition.

### 3.3 FIRESTOPPING

A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

\* END OF SECTION \*

## **SECTION 220000 - PLUMBING**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The drawings and the specifications including Section 22 05 00 "Supplemental Plumbing General Conditions" are hereby made a part of the work of this section.
- B. Coordinate with Section 01 91 00 Commissioning.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.
- D. Provision of waste management: Section 01 74 19, Construction Waste Management and Disposal.

#### **1.2 DESCRIPTION**

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections, and incidentals and the performing of operations required to provide a complete and functional plumbing system.
- B. Work shall be in accordance with the current edition of the Maine State Plumbing Code and applicable local ordinances.

#### **1.3 SUBMITTALS**

- A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:
  - 1. Piping materials.
  - 2. Valves.
  - 3. Pipe hangers.
  - 4. Fixtures and trim.
  - 5. Miscellaneous equipment.
  - 6. Piping, valves and equipment identification.
  - 7. Thermostatic mixing valve
  - 8. Firestopping.
- C. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- D. Product Data: Submit data on product characteristics, performance criteria and limitations.

E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

## PART 2 PRODUCTS

### 2.1 PIPING MATERIALS

A. Soil and Waste (Sanitary), Rainwater and Vent Piping:

1. Below Grade: Cast iron with push-on joints or Sched. 40 PVC.
2. Above Grade: Cast iron "no Hub" or Sched. 40 PVC. Vent piping may be Sched. 40 PVC but cast iron (ONLY) thru roof. All rainwater piping shall be insulated. Sanitary and rainwater piping in the garage area shall be insulated and heat traced)

B. Domestic Water Piping:

1. Piping at water entrance and within 3ft of water heaters and all piping from water heater to mixing valve: Type L hard copper tubing and cast bronze or wrought copper solder fittings.
2. Pipe mains and branch sizes larger than 1":
  - a. Type L hard copper tubing and cast bronze or wrought copper solder fittings.
  - b. Schedule 80 IPS Corzan CPVC pipe conforming to ASTM F441, and certified to NSF 61 and NSF 14. CPVC compound shall have a minimum cell classification of 24448. CPVC fittings shall be schedule 80 conforming to ASTM F439, fabricated from Corzan material with a minimum cell classification of 24447 and shall be NSF 61 and NSF 14 certified. Primer shall meet or exceed ASTM F656 and solvent cement for fittings shall meet or exceed ASTM F493, both shall be listed by the NSF as safe for use with potable water and approved by the pipe and fittings manufacturers. Installation, including supports, shall be per the manufacturer's recommendations.
3. Branch pipe sizes 1" and smaller (Contractor's option):
  - a. Type L hard copper tubing and cast bronze or wrought copper solder fittings.
  - b. Uponor AquaPEX, NSF rated, 180°F at 100psi, red (HW), blue (CW) and white (RHW).
  - c. "Flowguard Gold" CTS solvent-welded CPVC pipe and fittings. CPVC pipe and fittings shall be rated at 100 psig at 180°F and shall meet or exceed the requirements of ASTM D2846, the IBC, and be certified by the ANSI/NSF for

potable water applications. Installation, including supports, shall be per the manufacturer's recommendations.

- C. Exposed Waste Piping at Fixtures: Schedule 40 PVC with solvent welded joints and deep one piece escutcheon plates at traverse points.
- D. Solder: Lead-free (ONLY), Englehard Silvabrite 100, 440°F melting point, ASTM B32.
- E. Condensate Drain Piping: Schedule 40 PVC with solvent welded joints.

## 2.2 NO HUB COUPLINGS

- A. For DWV piping, couplings shall be Clamp-All HI-TORQ125, shall maintain 15 PSI hydrostatic seal, constructed 304SS housing and ASTM C-564 neoprene gasket. Couplings shall meet FM 1680, IBC and local codes and requirements.

## 2.3 VALVES

- A. Ball Valves: Copper alloy with stationary seat ring and chromium plated or stainless steel floating ball per Federal Specification WW-V-35B. Blowout proof stem, reinforced PTFE seal. Sizes 2" and larger shall have threaded ends. Provide lever handle with stem extension as required to allow operation without interfering with pipe insulation.
- B. Check Valves: Horizontal Swing, MSS SP-80, Type 3, Class 125.
- C. Drain Valves: Provide ball valves with 3/4" hose connection and brass cap.
- D. Fixture Service Stop Valves: Angle Wheel Handle Stop, ASME A112.18M.
  - 1. Each plumbing fixture shall have individual stop valves in the hot and cold supplies.
  - 2. Service stop valves exposed in finished areas shall be chrome-plated brass; in non-finished areas, ball valves shall be used in lieu of chromed supplies.
- E. Temperature and Pressure Relief Valves: Bronze body, tested under ANSI Z21.22, AGA and ASME rated, 125 psig/210°F relief settings.
- F. Balancing Valves: Taco "Accu-Flo".
  - 1. Bronze or brass body and internals, teflon seats, memory stop, 300 psi working pressure, 250°F working temperature. Balancing devices shall have provisions for connecting a portable differential pressure gauge. Each balancing device shall be sized to provide a differential pressure reading between 2 and 5 feet with the valve full open at design flow rates.
  - 2. Install per manufacturer's recommendations for adjacent length of straight pipe.

3. Submittals shall indicate gpm, size, wide open differential pressure meter reading, and actual water pressure drop.
- G. Schedule 80 CPVC Ball Valves: IPEX, George Fischer or Nibco with body, ball and stem constructed from ASTM D1784 CPVC compound, full port with tee shaped handle, PTFE seats and EPDM stem seals. Pressure rating shall be 232psi at 73°F.
- H. CTS CPVC Ball Valves: Sioux Chief 648 series brass/copper ball valve for CPVC with chrome plated ball, PTFE seats and EPDM o-ring.

## 2.4 PIPE HANGERS

- A. Adjustable Swivel Hangers:
  1. Pipe sizes 2" and less: Carpenter and Paterson Fig. 800, oversize for insulated piping systems.
  2. Pipe sizes larger than 2": Carpenter and Paterson Fig. 100, oversize for insulated piping systems.
- B. Riser Clamp: Carpenter and Paterson Fig. 126 CT copper plated for copper piping, Fig. 126 for iron and PVC piping.
- C. Insulation Shields: 18 ga. galvanized steel, 180° wrap, Carpenter and Paterson Fig. 265P, Type H.

## 2.5 FIXTURES AND TRIM

- A. (P-1) ADA Flush Valve Water Closet: Sloan ST-2029 (ONLY), floor-mounted, flush valve, elongated bowl, floor mount, white vitreous china, low consumption (1.28 gpf). Chrome trip lever shall be mounted on the wide side of the fixture.
  1. Flush Valve: Sloan #111-1.28 DFB (ONLY), ADA compliant, manual flush valve, 1.28 GPF, top spud connection, dual filter fixed bypass diaphragm with vacuum breaker, non-hold open handle. Handle shall be on the wide side of the stall or space to comply with ADA requirements.
  2. Seat: Bemis "Beneke" 523SS (ONLY) elongated seat, heavy duty solid plastic, open front less cover, integral bumpers, for elongated bowl, white color.
  3. Total installed height of front edge of seat shall be 17" to 19" above finished floor.
  4. Installation shall meet ADA and ANSI A117.1 requirements.
- B. (P-1A) ADA Tank Type Water Closet: American Standard Cadet Pro #215AA.104 (ONLY), floor-mounted, tank type, elongated bowl, white vitreous china, low

consumption (1.28 gpf). Chrome trip lever shall be mounted on the wide side of the fixture. Fixture shall be suitable for 12" rough-in.

1. Seat: Bemis "Beneke" 523SS (ONLY) elongated seat, heavy duty solid plastic, open front less cover, integral bumpers, for elongated bowl, white color.
2. Total installed height of front edge of seat shall be 17" to 19" above finished floor.
3. Installation shall meet ADA and ANSI A117.1 requirements.

C. (P-1B) ADA Tank Type Water Closet: American Standard Cadet Pro #215AA.104 (ONLY), floor-mounted, tank type, elongated bowl, white vitreous china, low consumption (1.28 gpf). Chrome trip lever shall be mounted on the wide side of the fixture. Fixture shall be suitable for 12" rough-in.

1. Seat: Bemis (ONLY) "Mayfair" 1280SLOW elongated seat, solid plastic, closed front with cover, integral bumpers, slow close for elongated bowl, white color.
2. Total installed height of front edge of seat shall be 17" to 19" above finished floor.
3. Installation shall meet ADA and ANSI A117.1 requirements.

D. (P-2) ADA Countertop Lavatory: countertop and sink by others, plumbing connections by plumber.

1. Faucet: Wolverine Brass "Finale" #85271 (ONLY), cast brass body with polished chrome finish, single lever handle. Provide with Neoperl PCA Spray (ONLY) vandalproof 0.5 gpm aerator.
2. Drain: Perforated grid strainer with bright metal finish.
3. Trap: 1-1/4" PVC P-trap with cleanout plug. Adjustable with connected elbow and nipple to wall.
4. Hose Bibb: Lead free, quarter turn hose bibb with vacuum breaker mounted to wall under lavatory shroud.
5. Installation shall be compliant with ANSI A117.1 and ADA Guidelines. Insulate exposed traps and supplies with Truebro Lavguard.

E. (P-2A) ADA Wall Hung Lavatory: Kohler "Greenwich" # K-2031-0, 20"x18", ADA compliant, self-rimming, white vitreous china, with wall hanger, single faucet hole.

1. Faucet: Wolverine Brass "Finale" #85271 (ONLY), cast brass body with polished chrome finish, single lever handle. Provide with Neoperl PCA Spray (ONLY) vandalproof 0.5 gpm aerator
2. Drain: Perforated grid strainer with bright metal finish.

3. Trap: 1-1/4" PVC P-trap with cleanout plug. Adjustable with connected elbow and nipple to wall.
  4. Installation shall be compliant with ANSI A117.1 and ADA Guidelines. Insulate exposed traps and supplies with Truebro Lavguard.
- F. (P-2B) ADA Wall Hung Lavatory: : Kohler "Greenwich" # K-2031-0, 20"x18", ADA compliant, self-rimming, white vitreous china, with wall hanger, single faucet hole.
1. Faucet: Wolverine Brass "Finale" #85270 (ONLY), cast brass body with polished chrome finish, single lever handle. Provide with Neoperl PCA Spray (ONLY) vandalproof 0.5 gpm aerator.
  2. Drain: Pop-up drain assembly with bright metal finish.
  3. Trap: 1-1/4" PVC P-trap with cleanout plug. Adjustable with connected elbow and nipple to wall.
  4. Installation shall be compliant with ANSI A117.1 and ADA Guidelines. Insulate exposed traps and supplies with Truebro Lavguard.
- G. (P-3) ADA 60" Shower: Shower and ADA/ANSI grab bars by others.
1. Shower Controls: Symmons Origins 9605-X-PLR-VP-L2, ASSE 1016 compliant pressure balancing mixing valve with adjustable stop screw to limit handle turn with integral diverter and volume control. Fixed head shall be 2.0 gpm, single mode with easy to clean nozzles. Provide with in-line vacuum breaker and non-positive shutoff, flexible 5' metal hose, wall connection and flange, 36" ADA slide bar for hand shower mounting. Hand shower shall be Niagara "Earth" handheld shower head (ONLY) with 3 spray settings, non-removable flow compensator, chrome plated with 1.5GPM aerator.
  2. Drain: Watts FD-100-FC, nickel bronze strainer with heel proof grate, 2" outlet with surface membrane clamp. Note: shower drain shall be listed on flooring manufacturer's recommended products list.
  3. Installation shall be compliant with ANSI A117.1 and ADA Guidelines.
- H. (P-3A) ADA 36" Shower: Shower and ADA/ANSI grab bars by others.
1. Shower Controls: Symmons Symmons Origins 9605-X-PLR-VP-L2, ASSE 1016 compliant pressure balancing mixing valve with adjustable stop screw to limit handle turn with integral diverter and volume control. Fixed head shall be 2.0 gpm, single mode with easy to clean nozzles. Provide with in-line vacuum breaker and non-positive shutoff, flexible 5' metal hose, wall connection and flange, 36" ADA slide bar for hand shower mounting. Hand shower shall be Niagara "Earth" handheld shower head (ONLY) with 3 spray settings, non-removable flow compensator, chrome plated with 1.5GPM aerator.

2. Drain: Watts FD-100-FC, nickel bronze strainer with heel proof grate, 2" outlet with surface membrane clamp. Note: shower drain shall be listed on flooring manufacturer's recommended products list.
  3. Installation shall be compliant with ANSI A117.1 and ADA Guidelines.
- I. (P-3B) 36" Shower: InPro "Prizm", 36"x36" solid surface (polyester/acrylic blended resin) fungal and bacterial resistant shower receptor. Color selection by Architect.
1. Shower Controls: Symmons Symmons Origins 9605-X-PLR-VP-L2, ASSE 1016 compliant pressure balancing mixing valve with adjustable stop screw to limit handle turn with integral diverter and volume control. Fixed head shall be 2.0 gpm, single mode with easy to clean nozzles. Provide with in-line vacuum breaker and non-positive shutoff, flexible 5' metal hose, wall connection and flange, 36" ADA slide bar for hand shower mounting. Hand shower shall be Niagara "Earth" handheld shower head (ONLY) with 3 spray settings, non-removable flow compensator, chrome plated with 1.5GPM aerator.
  2. Drain: Inpro tamper resistant, modified Oatey 42150 drain body with fiber/rubber washer and 12 gauge type 304 stainless steel strainer.
- J. (P-3C) 60" Shower: Inpro "Prism", 60"x32" solid surface (polyester/acrylic blended resin) fungal and bacterial resistant tub replacement shower receptor with offset drain. Color selection by Architect.
1. Shower Controls: Symmons Symmons Origins 9605-X-PLR-VP-L2, ASSE 1016 compliant pressure balancing mixing valve with adjustable stop screw to limit handle turn with integral diverter and volume control. Fixed head shall be 2.0 gpm, single mode with easy to clean nozzles. Provide with in-line vacuum breaker and non-positive shutoff, flexible 5' metal hose, wall connection and flange, 36" ADA slide bar for hand shower mounting. Hand shower shall be Niagara "Earth" handheld shower head (ONLY) with 3 spray settings, non-removable flow compensator, chrome plated with 1.5GPM aerator.
  2. Drain: Inpro tamper resistant, modified Oatey 42150 drain body with fiber/rubber washer and 12 gauge type 304 stainless steel strainer.
- K. (P-4) ADA Kitchen Sink, Double Bowl: Elkay LRAD 372255, 18 gauge type 304 stainless steel, 37"x22"x5.5" overall size, 4 faucet holes on 4" centers, fully sound deadened with concealed overflow head.
1. Faucet: Symmons Origins Model S-23-2 wrist operation handle, 8-3/4" swing spout with Neoperl PCA Perlator 1.5 gpm vandal resistant aerator, polished chrome finish, side spray, ceramic control cartridge, single lever with pull-out side spray.
  2. Strainer: Removable basket and neoprene stopper.
  3. Sink installation shall be compliant with ANSI A117.1 and ADA Guidelines.

4. Exposed traps and supplies with Truebro Lavguard.
- L. (P-5) Washing Machine Supply and Drain: In-wall concealed, fire rated, galvanized metal, (IPS Corporation) Guy Gray FRM12, 2" drain, single shutoff valve to provide simultaneous control of hot and cold water and water hammer arrestors.
- M. (P-6) Mop Basin: Fiat Model MSB-2424, molded stone, 24"x24"x10" with 1" wide shoulders; 3" stainless steel drain with combination dome strainer and lint basket.
1. Faucet: Fiat Service Faucet Model 830-AA, chrome-plated with vacuum breaker, integral stops, adjustable wall brace, pail hook, and 3/4" hose thread on spout.
  2. Hose and Hose Bracket: Fiat Model 832-AA, 30" long flexible heavy duty 5/8" cloth reinforced rubber hose with 3/4" chrome coupling at one end, 5"x3", stainless steel bracket with rubber grip.
  3. Wall Guard: Fiat Model MSG-2424, stainless steel wall guards.
  4. Mop Bracket: Fiat Model 889-CC, 24" stainless steel.
  5. Caulk around mop basin at floor and walls with white silicone caulk.
- N. (P-7) Bottle Filling Station: Elkay model LZWSM8K, ezH2O in-wall bottle filling station with mounting frame, filtered water with capacity for 8.0 GPH of 50F water. Unit shall include filter, green ticker (bottles filled count), hands free operation with laminar flow discharge, visual filter monitor and electronic bottle filler activation. Bottle filler shall be ADA and ANSI 117.1 compliant and shall meet NSF/ANSI 42, 53, 61 and 372.
- O. (P-8) Utility Sink: Fiat model FLDII, floor mounted two bowl utility sink, 40"x24"x33-3/4" overall dimensions, molded stone basin with white baked enamel legs. Provide with Fiat model A-1 deck mounted faucet.

## 2.6 MISCELLANEOUS EQUIPMENT

- A. Floor Drain (FD): Watts FD-100-FC, nickel bronze strainer with heel proof grate, 3" outlet with surface membrane clamp. Note: shower drain shall be listed on flooring manufacturer's recommended products list.
- B. Floor/Yard Cleanout (FCO/YCO): Watts CO-200-RFC7 adjustable floor cleanout, epoxy coated cast iron body, with gas and watertight ABS tapered thread plug. Nickel bronze top with surface membrane clamp. Provide size equal to piping served with maximum size of 4". Note: Floor cleanouts shall be listed on the flooring manufacturer's recommended products list.
- C. Wall Cleanout (WCO): Sanitary tee with threaded raised nut or countersunk-nut cleanout plug located behind Zurn Z-1468 round stainless steel wall access cover.

- D. Backflow Preventor (BFP): Conforming to AWWA C506, FCCHR-USC Manual Section 10, and UL listed. Types, sizes and capacities scheduled.
  - 1. Reduced Pressure Zone (RPZ): Reduced pressure principle type; bronze body with stainless steel internals. Provide bronze body ball valves, test cocks, and air gap fittings.
- E. Freezeless Wall Hydrant: Woodford Model 65, 3/4" size, brass body, automatic draining, loose key tee, with anti-siphon vacuum breaker.
- F. Thermometers: Trerice Series V80445 or Ashcroft Series 600A-04, vapor actuated, adjustable angle, 4-1/2" diameter face, cast aluminum case, stainless steel ring, glass window, white background dial with black figures, black finished stainless steel pointer, brass movement with bronze bearings, phosphor bronze bourdon tube. Accuracy shall be to within one scale division.
  - 1. Thermowell: Provide with brass thermometer wells projecting a minimum of 2" into the pipe with extension to face of insulation. Provide with heat transfer fluid to fill interstitial space between bulb and well.
  - 2. Range: 30°F to 240°F for domestic hot water systems.
- G. Pressure Gauges: Trerice Series 800 or Ashcroft Type 1005, Grade B, 3-1/2" dial, ANSI B40.1, drawn steel case, white background dial with black figures, clear glass window, brass movement, beryllium copper bourdon tube, 0 to 100 PSI range, accuracy shall be within 2% over middle half of scale and 3% over the remainder. Provide with shut off petcock and restrictor.
- H. Water Hammer Arrestor (Shock Absorber): Plumbing and Drainage Institute listed.  
  
Schedule:  
  
"A" - Size #100 PDI - 0-11 Fixture Units  
"B" - Size #200 PDI - 12-32 Fixture Units  
"C" - Size #300 PDI - 33-60 Fixture Units
- I. Vacuum Breaker: Watts Model N36, 3/4" size, 20 CFM capacity.
- J. Strainer: Watts Series 777, MIL-S-16293, bronze body wye-type, 200 WOG rating, screwed end connections, 20 mesh stainless steel, monel, or bronze screen.
- K. Trap Primer (TP): Zurn Z-1022 Automatic Trap Primer, all bronze body with integral vacuum breaker, non-liming internal operating assembly with gasketed bronze cover, flow-thru design operates on a 2-5psi pressure drop.
- L. Indirect Waste Receptor (IW): Zurn Model Z1025-4, 4", fixed air gap, dura-coated cast-iron, with Z1000-P, trap primer connection.
- M. Thermostatic Mixing Valve: Honeywell MX-series (ONLY), capacity and size indicated in equipment schedule. Lead free brass / stainless steel construction,

adjustable temperature setting, ASSE 1017 listed. Maximum working pressure shall be 150PSI (minimum), operating temperature range shall be 113°F-149°F, setting shall be 115°F.

## 2.7 PIPING, VALVE, AND EQUIPMENT IDENTIFICATION

- A. Piping identification: Provide plastic "wrap-around" identification markers indicating flow and fluid flowing for the following:
  - 1. Domestic Hot Water
  - 2. Recirculated Domestic Hot Water
  - 3. Domestic Cold Water
  - 4. Vent Piping
  - 5. Exposed Above-ground Sanitary Drain Piping
  - 6. Condensate Piping
- B. Markers shall be placed 30-50 ft. apart for piping in accessible areas.
- C. Markers shall be placed outside the pipe insulation and in the most obvious location for viewing.
- D. Valve Tags:
  - 1. Attach to each valve a 1-1/2" round or octagonal brass tag with 1/2" indented numerals filled with a durable black compound. In addition to the valve numbers, each tag shall identify the system it controls. Service stop valves exposed in finished areas need not be tagged.
  - 2. Tags shall be securely attached to stems of valves with copper or brass "S" hooks, or chains.
  - 3. Valve charts shall be provided for each piping system and shall consist of schematic drawings of piping layouts, showing and identifying each valve and describing its function. Upon completion of the work, one (1) copy of each chart, sealed to rigid backboard with clear lacquer placed under glass and framed, shall be hung where directed. Two (2) additional unmounted copies shall be delivered to the Architect.
  - 4. Tags and charts shall be coordinated with Section 230000 Heating System and when completed this work shall have been done sequentially.
- E. Equipment Identification: Provide laminated plastic nameplates for equipment, pumps, mixing valves, backflow preventers, and balancing valves. Nameplates shall be laminated 0.125-inch thick melamine plastic conforming to Fed. Spec. L-P-387, black with white center core. Surface shall be a matte finish, corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be a minimum of 0.25-inch high normal block lettering.

## PART 3 EXECUTION

### 3.1 SURFACE CONDITIONS

#### A. Inspection:

1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
2. Verify that plumbing may be installed in strict accordance with pertinent codes and regulations and the reviewed Shop Drawings.

### 3.2 INSTALLATION OF PIPING

- A. Provide and erect in accordance with the best practice of the trade piping shown on the drawings and as required to complete the intended installation. Make offsets as shown or required to place piping in proper position to avoid other work and to allow the application of insulation and finish painting to the satisfaction of the Architect.
- B. The size and general arrangements, as well as the methods of connecting piping, valves, and equipment, shall be as indicated, or so as to meet the requirements of the Architect.
- C. Piping shall be erected so as to provide for the easy and noiseless passage of fluids under working conditions.
- D. Install unions to facilitate removal of equipment.
- E. Copper pipe shall be reamed to remove burrs.
- F. Connections between copper and steel piping shall be made with dielectric fittings.
- G. Solder joints shall be made with lead free solder. Clean surfaces to be soldered and use a paste flux. Wash joints with sodium bicarbonate and water to remove corrosive effects of heated solder paste. Caution: Lead-bearing solder is not permitted.
- H. Pipe penetrations through walls, floors and ceilings shall be in accordance with Section 23 05 00 "Supplemental General Mechanical Requirements". Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.
- I. Provide a cleanout in the vertical position at the base of each sanitary and roof drain drop.
- J. Sanitary and vent piping shall be sized and installed at 1/4" per foot slope.
- K. Rainwater piping shall be sized and installed at 1/8" per foot slope.
- L. All vertical and horizontal penetrations through walls, floors and ceilings shall be sealed against air movement between spaces.

### 3.3 PIPE HANGERS

- A. Impact driven studs are prohibited.
- B. Copper Tubing: supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

Copper Size	Hanger Intervals	Rod Sizes
1/2"	5'	3/8"
3/4"	6'	3/8"
1"	6'	3/8"
1-1/4"	8'	3/8"
1-1/2"	8'	3/8"
2"	10'	3/8"

- C. Cast Iron Pipe: Supported at intervals with rod sizes as follows, double nuts on hangers and on beam clips.

Cast Iron Size	Hanger Intervals	Rod Sizes
1-1/2"	5'	3/8"
2"	5'	3/8"
2-1/2"	5'	1/2"
3"	6'	1/2"
4"	7'	5/8"

- D. PVC/CPVC Pipe: Supported at 3 foot intervals for sizes 1" and smaller and 4 foot intervals for sizes 1-1/4" and larger
- E. Verticals: Supported by use of clamp hangers at every story height, and at not more than 6 feet intervals for copper piping 1-1/4" and smaller size.
- F. Spring Isolators: All pipe 20' upstream and downstream of pumps.

### 3.4 CLOSING IN UNINSPECTED WORK

- A. General: Cover up or enclose work after it has been properly and completely reviewed.
- B. If any of the work is covered or enclosed prior to required inspections and review, uncover the work as required for the test and review. After review, tests and acceptance, repairs and replacements shall be made by the appropriate trades with such materials as necessary for the acceptance by the Architect and at no additional cost to the Owner.

### 3.5 CLEANUP AND CORROSION PREVENTION

- A. Upon completion of the work thoroughly clean and flush piping systems to the sewer with water.

- B. Fixtures, piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- C. Caulk around fixtures at floor and wall.
- D. Before covering is applied to piping systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

### 3.6 DISINFECTING

- A. After the entire potable water system is completed, cleaned and tested, and just before the building is ready to be occupied, disinfect the system as follows: After flushing the mains, introduce a water and chlorine solution for a period of not less than three hours before final flushing of the system.

### 3.7 TESTS

- A. Sanitary soil, waste and vent piping: Fill with water to top of vents, and test as required by Code.
- B. Water piping shall be tested to a pressure of 100 lbs. per square inch for at least 30 minutes. Pressure drop in this period shall not exceed two pounds per square inch. Leaks shall be repaired and system retested. Notify Architect 24 hours before test is to be performed.

### 3.8 INSTRUCTIONS

- A. On completion of the project, provide a competent technician to thoroughly instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner.

### 3.9 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

\* END OF SECTION \*

## **SECTION 220500 - SUPPLEMENTAL PLUMBING GENERAL REQUIREMENTS**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The General Conditions, Supplemental General Conditions and Instructions to Bidders shall apply to this work. Read these to be familiar with conditions related to the installation of the work.
- B. Coordinate with Section 01 91 00 Commissioning.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.
- D. Provision of waste management: Section 01 74 19, Construction Waste Management and Disposal.

#### **1.2 WORK SHOWN ON DRAWINGS**

- A. The drawings accompanying this specification, as a part thereof, are working drawings indicating the location and arrangement of the increments of the systems of this section of work. Material deviation from this arrangement, process or means of application, shall bear the Engineer's review stamp before the change is made on the job or materials are ordered. Changes made without such review shall be ordered removed and items installed as specified shall be provided at no additional expense to the Owner.
- B. The drawings are not intended to show in minute detail minor items of installation or materials such as specific fittings or findings.

#### **1.3 MATERIALS AND LABOR**

- A. Furnish materials and labor necessary to deliver to the Owner a complete and operable system installed in accordance with the contract documents.
- B. Materials shall be of the best quality. Workmanship shall be of highest grade and construction shall be done according to best practices of the trade.
- C. Provide, when required, labeled samples of material or equipment specified herein or proposed to be used in this work.
- D. Where words "furnish", "provide", or "install" are mentioned, either singly or in combination, these words are hereby interpreted to mean "furnish and install" or "provide and install", including materials complete with connections, supplemental devices, accessories and appurtenances, unless specifically otherwise noted. These words are likewise hereby interpreted as being prefixed to materials, equipment, and apparatus hereinafter mentioned, either in abbreviated or scheduled information or in the technical sections of the specifications.

#### 1.4 EQUIPMENT INSTALLATION IN HEATING SEASON

- A. The system shall be installed such that the construction area will have sufficient heat to maintain temperature above 40°F throughout the construction period.
- B. Coordinate with section 01 50 00 Temporary Facilities.

#### 1.5 COOPERATION BETWEEN TRADES

- A. Provide information sufficiently in advance of this work, so that work by the other trades may be coordinated and installed without delays. Furnish and locate sleeves, supports, anchors and necessary access panels.
- B. Where work is concealed, assure it does not project beyond finished lines of floors, ceilings, or walls.
- C. Equipment or piping requiring access found to be located above sheetrock ceilings shall be brought immediately to the attention of the Architect for resolution.

#### 1.6 VISITING THE PREMISES

- A. Visit the premises and review the existing conditions, as applicable.

#### 1.7 ORDINANCES, AUTHORITIES, PERMITS, AND FEES

- A. Obtain necessary permits and licenses, give notices and comply with laws, ordinances, rules, regulations or orders affecting the work, and pay fees and charges in connection therewith.
- B. The "authority having jurisdiction" is the organization, office, or individual responsible for "approving" equipment, an installation, or a procedure.

#### 1.8 PROTECTION OF WORK AND MATERIALS

- A. Protect and care for materials delivered and work performed until the completion of the work. Defective equipment or equipment damaged in the course of storage, installation or test shall be replaced or repaired to the satisfaction of the Engineer at no additional cost to the Owner.

#### 1.9 INSURANCE

- A. Purchase and maintain Public Liability and Property Insurance during the progress of the work and until completion and acceptance of the entire project by the Owner in the amounts as specified in the General Conditions.

## 1.10 APPLICABLE CODES

- A. Work and materials shall conform to the latest rules and regulations listed below and these rules and regulations hereby are made part of this specification. They include, but are not necessarily limited to the following:

American Society for Testing and Materials (ASTM)  
Underwriters' Laboratories, Inc. (UL)  
Air Moving and Conditioning Assoc. (AMCA)  
American Society of Heating, Refrigerating, and Air  
Conditioning Engineers (ASHRAE)  
American Society of Mechanical Engineers (ASME)  
National Electrical Manufacturers Association (NEMA)  
Institute of Electrical and Electronics Engineers (IEEE)  
American National Standards Institute (ANSI)  
National Fire Protection Association (NFPA)  
American Water Works Association (AWWA)  
Local Fire Code  
Local Plumbing Codes  
American Welding Society  
Maine Uniform Building and Energy Codes (MUBEC)

## 1.11 SHOP DRAWINGS

- A. Submit shop drawings, manufacturers' data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, to be submitted to the Architect. Shop drawings will be returned "No Exceptions Taken", "Make Corrections Noted", "Amend and Resubmit", "Submit Specified Item", or "Rejected". Work shall progress in accordance with "Reviewed" shop drawings (ONLY).
- B. Shop drawings that are facsimiled, (FAX) produced, or photocopies of FAX documents will not be considered or reviewed. Only originals and or photocopied originals, or PDF files complying with this section will be considered. Submittals that include illegible pages will be rejected.
- C. Groups of similar shop drawings shall be submitted as individual bound documents with covers and indexes. Submittals shall be grouped by specification section and major paragraph number (ie 2.1, 2.2, 2.3, etc) in a separate submittal (file) and shall include all items under that paragraph. Submittals shall not include items from multiple major paragraphs and shall be rejected without review if they do (the exception to this is that Automatic Temperature Controls may be submitted as a single submittal, Automatic Fire Protection (sprinkler) may also be submitted as a single submittal.) Rejection of individual items shall not be cause for rejection of the entire document.
- D. Clearly indicate item(s) to be reviewed on each submission by **highlighting**, underlining or indicating with arrows, the intended item(s). All proposed options and accessories shall be clearly marked to identify what is to be provided. Submissions not clearly marked shall be returned "Amend and Resubmit".

- E. Shop drawings must bear the Engineer's review stamp. In the event that the Engineer returns shop drawings "Amend and Resubmit" or "Rejected", the shop drawing must be revised and resubmitted for review.
- F. Furnishing of the specified item must still produce the results and performance, dependability and quality reasonably to be expected within the spirit of the specifications, drawings, and the standard of good plumbing performance normal to the trade.
- G. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- H. Product Data: Submit data on product characteristics, performance criteria and limitations.
- I. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- J. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

#### 1.12 SUBSTITUTIONS

- A. Where the specifications allow the substitution of a product, still this product is subject to review by the Engineer in accordance with the paragraph entitled "Shop Drawings". Review of a substitute item is an indication only that the substitute item is compatible with the specified item as a claim of the manufacturer. Insure dimensional propriety, performance, and quality of the substitute item.
- B. Reference in the specifications or on the drawings to any product, material, fixture, form or type of construction, by proprietary name, manufacturer, make or catalog number, establishes a standard of quality or design and is not meant to limit competition. Use any equivalent substitute provided favorable written review by the Engineer is first obtained. The (ONLY) notation in the specification is an exception to this and leaves no option.
- C. For materials or equipment which are supplied with integral or factory applied finish, the colors will be considered in evaluating substitutions.
- D. For the purpose of avoiding conflicts with other trades, contracts, and adjoining work where more than one (1) article, device, material, fixture, form or proprietary name, manufacturer, make or catalog number, the first named shall be used as the basis of design and details. The cost of any changes because of substituted item shall be borne by the Contractor requesting such change.

#### PART 2 PRODUCTS

NOT USED

## PART 3 EXECUTION

### 3.1 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project Site
  - 1. Review methods and procedures related to plumbing shutdown and installation.
  - 2. Coordinate and review locations for access panels for plumbing shutoffs.

### 3.1 EQUIPMENT SUPPORTS

- A. Furnish and install equipment supports for plumbing equipment as required. Supports shall be subject to review by the Engineer.

### 3.2 SLEEVES AND PREPARED OPENINGS

- A. Coordinate cutting, patching and setting of sleeves, frames, framing and lintels for openings with other trades. Sleeves shall be furnished by the Contractor. All penetrations through concrete shall be sleeved as required by IBC.
- B. Failure to give timely notice of and to locate openings and furnish sleeves shall cause no additional expense to the Owner.

### 3.3 CONNECTION TO EQUIPMENT

- A. Provide piping connections, supports, brackets, compensators or flexible connections to prevent application of excessive stresses to equipment.
- B. Equipment shall be installed with flanges or unions in such a manner as to permit disconnecting for removal of tubes, coils, elements and other equipment for inspection, service and repairs.

### 3.4 ACCESS TO EQUIPMENT

- A. The installation of work performed shall provide reasonable accessibility for operation, inspection, and maintenance of equipment and accessories. The Engineer shall determine the adequacy of such accessibility.

### 3.5 ACCESS PANELS

- A. Access panels shall be provided where indicated on the drawings and as required for access to fire dampers, smoke dampers, valves and other serviceable components.
- B. Access panels installed in fire-rated assemblies shall have the same fire rating as the assembly.

### 3.6 PAINTING OF EQUIPMENT

- A. Exposed ironwork, including steel supports and hangers in unfinished spaces, mechanical rooms, pits, and trenches shall be properly cleaned, prepared and painted with two (2) coats of black asphaltum varnish.

### 3.7 GUARDS

- A. Exposed moving and rotating elements of plumbing equipment items shall be protected with suitable guards for personnel protection. Guards shall be of rigid construction, firmly positioned. Holes shall be provided in guards at shaft centers to facilitate tachometer readings.

### 3.8 LUBRICATION

- A. Furnish and install grease fittings for points requiring lubrication. Furnish extension type fittings as required to provide easy access for maintenance lubrication.
- B. Furnish initial charges of lubricants for equipment. Lubricants shall be in conformance with the manufacturer's requirements and recommendations.

### 3.9 ELECTRIC MOTORS AND MOTOR CONTROLS

- A. Unless otherwise noted, motors, motor starters and other electrical accessories which are specified under Plumbing and Mechanical specifications shall be selected with characteristics as follows:

1/2 Horsepower and less - 120 volt, 1 phase, 60 Hz.  
3/4 Horsepower and greater - 208 volt, 3 phase, 60 Hz.

- B. Motors shall be built in accordance with the latest applicable NEMA, IEEE and ANSI Standards. Motors shall be of the latest type and quality specified under individual items of equipment.
- C. Magnetic motor starters for plumbing and mechanical items of equipment shall be furnished under Division 26 unless the starter is an integral part of a factory packaged item of equipment. Each starter furnished as an integral item of equipment shall be provided with overload heater elements. Starters shall have single phase protection or shall have relays installed to provide this feature. Starters shall be equipped with suitable step-down transformers to provide required control voltage.
- D. Motors shall have a minimum continuous duty service factor of 1.15. Minimum motor efficiency shall be:

<u>MOTOR HORSEPOWER</u>	<u>PERCENTAGE EFFICIENCY</u>		
	<u>(1200RPM)</u>	<u>(1800 RPM)</u>	<u>(3600 RPM)</u>
1, 1-1/2, 2, 3	----	78.0	76.0
5	87.4	87.4	86.3
7.5	89.4	89.8	87.7
10	89.7	90.3	89.0

### 3.10 EXISTING CONDITIONS

- A. The Contractor shall be responsible for correcting any damage to existing systems, components or utilities that are to remain in service.
- B. The Contractor shall visit the premises and review Architectural, Structural and Civil drawings to become familiar with the existing conditions prior to submitting a bid. No additional compensation will be allowed for existing conditions that are readily apparent during a site visit.

### 3.11 EXISTING UTILITIES AND SERVICES

- A. Existing building shall remain in use throughout construction. All existing utilities must remain in service.
- B. Owner shall be provided with 14 day advance notice for all utility/service shutdowns.

### 3.12 CLEANING OF SYSTEMS

- A. Piping systems shall be thoroughly cleaned and flushed prior to initial operation.
- B. Thoroughly clean exposed portions of the plumbing installation, removing labels and foreign substance.
- C. Furnish detergents, solvents, cleaning compounds, and tools required for cleaning operations.
- D. Keep the premises free from accumulation of waste material or rubbish and at the completion of the work, remove from the job site tools, scaffolding, surplus materials, and rubbish, leaving the work areas "broom" clean.

### 3.13 STARTING OF EQUIPMENT

- A. Testing or starting of equipment shall be done in collaboration with trades concerned to insure safe and proper operation of the equipment.
- B. Prior to starting equipment, provide lubrication at required points. Before starting any electrical or electric motor driven equipment, a check must be made to insure that proper heater coils are installed in the starters and that the equipment is rotating in the proper direction.

### 3.14 OPERATIONAL TESTING

- A. Operate systems until successful operation is demonstrated to the Engineer. This initial operation shall be in addition to the testing of the system and shall be done after the system is cleaned and finished.

### 3.15 RECORD DRAWINGS

- A. During construction, keep an accurate record of deviations to the installation of the work as indicated on the drawings. Upon completion of the work, furnish a copy of this record to the Engineer. **Submit record drawings before requesting final payment.**

### 3.16 MANUFACTURER'S REPRESENTATIVE

- A. As indicated in the Technical Sections of this specification or as directed by the Engineer, provide the services of a factory trained Engineer or Technician to inspect, adjust, and place in proper operating condition the equipment or item involved. No additional compensation will be allowed for such service.

### 3.17 MANUFACTURER'S INSTRUCTIONS, OPERATION AND MAINTENANCE DATA

- A. Provide for each item of equipment or apparatus furnished, a complete set of printed instructions obtained from the manufacturer covering proper operation, maintenance, lubrication, cleaning, servicing, adjustment, and safety instructions.
- B. Manufacturer's data shall include performance data (curves are preferred where applicable) complete parts lists, recommended spare parts lists, piping, and wiring diagrams.
- C. Arrange data in complete sets, properly indexed and marked.
- D. Data shall include a complete set of shop drawings.
- E. Material shall first be submitted in preliminary form for review by the Engineer. After review, submit two (2) copies in bound volumes to the Engineer for distribution.

### 3.18 GUARANTEES

- A. An item becomes "defective" when it ceases to conform to the Contract Documents. Guarantees begin on the date of issuance of a certificate authorizing final payment or certificate of substantial completion with the Owner taking occupancy or beneficial use thereafter.
- B. Upon completion of the work and before applying for final payment, furnish a written guarantee, stating that the work complies with the provisions of codes listed herein and the local enforcing authorities, and that it will be free from defects of material and workmanship for not less than one (1) year. Guarantee shall further state that the Contractor will, at his own expense, repair or replace any of his material and work which may become defective during the time of guarantee, together with other work damaged as a consequence of such defects.
- C. Repeated malfunctioning or failure in service of any item or work of the system is sufficient cause for the Engineer to order the removal of the item, and its replacement with new item at the expense of the Contractor.

### 3.19 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 Firestopping. All penetrations of fire-rated assemblies including walls and floors by plumbing system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

\* END OF SECTION \*

## **SECTION 230000 - HVAC SYSTEM**

### **PART 1 GENERAL**

#### **1.1 DESCRIPTION**

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the heating and ventilating systems indicated.

#### **1.2 RELATED DOCUMENTS**

- A. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" are hereby made a part of the work of this section.
- B. Coordinate with Section 01 91 00 Commissioning.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.
- D. Provision of waste management: Section 01 74 19, Construction Waste Management and Disposal.

#### **1.3 SUBMITTALS**

- A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 23 05 00, Supplemental Mechanical General Requirements, apply are as follows:
  - 1. Piping materials.
  - 2. Valves.
  - 3. Hydronic Specialties
  - 4. Hangers
  - 5. Piping, valve and equipment identification
  - 6. Wall heaters.
  - 7. Energy recovery ventilator.
  - 8. Hydronic duct coils.
  - 9. Kitchen Exhaust Hoods
  - 10. Cabinet Unit Heater
  - 11. Heat pump system.
- C. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- D. Product Data: Submit data on product characteristics, performance criteria and limitations.

- E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

## PART 2 PRODUCTS

### 2.1 PIPING MATERIALS

- A. Hot Water (HWS/R) Heating Piping shall be one of the following:
  - 1. Type L hard copper tubing and cast bronze or wrought copper solder fittings.
  - 2. PEX Piping (Insulated): Wirsbo hePEX cross-linked polyethylene tubing with ProPEX brass fittings as manufactured by Uponor. Tubing shall have crosslinked polyethylene inner and outer layers with an oxygen barrier capable of limiting oxygen diffusion below 0.1 g/m<sup>3</sup> per day at 104°F. Tubing shall be rated to handle 200°F water temperature at 80 psi. The tubing shall carry a thirty year warranty as standard.

### 2.2 REFRIGERANT PIPING

- A. Refrigerant Piping: Dimensions and material requirements for pipe, pipe fittings and components shall conform to ASHRAE 15 and ANSI B31.5 and shall be compatible with fluids used and capable of withstanding the pressures and temperatures of the service.
- B. All piping exterior to building, shall be a minimum of type "L", "ACR" rated straight pipe for R-410A or as specified. All piping on the building interior shall be "L", ACR" rated rolled soft copper or line set for R-410A or as specified, piping (after annealing) shall have sufficient wall thickness for a continuous operating pressure of 600 PSI per ASME B 31.5-2010.
- C. Tubing used for refrigerant service shall be cleaned, sealed, capped, or plugged prior to shipment from the manufacturer's plant.
- D. All joints shall be brazed except at the indoor units which shall be flared.  
Brazing Materials: Provide AWS A5.8 brazing filler metal Type BAg-5 with AWS Type 3 flux, except Type BCuP-5 or BCuP-6 may be used for brazing copper-to-copper joints.
  - 1. Dry Nitrogen: Dry nitrogen must be used during all brazing (pressure regulated to 3 PSI) to prevent copper plate or oxidation formation.
- E. All piping shall be installed in accordance with the mechanical design. Any deviation shall be submitted for prior approval to the mechanical engineer prior to installation. Selected copper tube must be of suitable wall thickness for higher operation pressures.

- F. Flaring: Flared tube ends should have a smooth, even round flare of sufficient length to fully engage the mating surface of the flare nut, without protruding into the threads. Use only "PVE" or "POE" refrigeration oil when making flares. Dedicated flare block and tool is recommended. Only use synthetic oil on the flare tool.
- G. Pressure testing: Tighten down stop valves before any pressure testing to prevent nitrogen from leaking back through condenser and contaminating refrigerant.

Pressure testing shall be done in three (3) steps.

Step 1 – Leak check 3 minutes at 150 PSI

Step 2 – Leak check after 5 minutes at 325 PSI

Step 3 – Leak check after 24 hours at 550 PSI (450 psi for systems with vertical Air Handlers) Always check flare nuts for leaks using bubble solution. Be sure to use a recommended product. Do not use a watered down fairy liquid solution.

- H. Leak testing and evacuation shall be done in accordance with the US EPA "Green Chill Best Practices Guideline Ensuring Leak-Tight Installation of Commercial Refrigerant Equipment."
- I. Evacuation procedures: Evacuation procedures shall be performed as follows:
1. Evacuate the system to 4000 microns. Break the vacuum with dry nitrogen to a pressure of 2-3 PSI and hold for 15 minutes.
  2. Evacuate system to 1500 microns and maintain for 20 minutes. Break the vacuum with dry nitrogen to a pressure of 2-3 PSI and hold for 15 minutes.
  3. Evacuate system to below 500 microns and hold for 60 minutes.
  4. Evacuate system to below 300 microns and hold for 24 hours.

Vacuum pump check valve should be used to prevent mineral oil from being drawn into the system. These procedures must be adhered to, documented and included in the HVAC subcontractors price.

- J. Refrigerant charging: Weigh in additional refrigerant with digital scales. Calculate charge based on total line length plus lb/ft of diameter. Check with each unit model for correct multiplier. After the amount of refrigerant to be added is determined write it down on the label on the back side of the front cover. After the vacuum/drying is complete, charge the additional refrigerant in its liquid state through the liquid stop valve service port.

Make sure to use installation tools exclusively used on R410A installations to withstand the pressure and to prevent foreign material from mixing into the system.

- K. Ball valves: Ball valves for refrigerant service shall be Streamline Cyclemaster ball valves, with full port construction, rupture-proof encapsulated stem, UL

Listed with a maximum working pressure of 700 psig and a working temperature range of -40°F to 300°F. Materials shall be compatible with all CFC, HCFC and HFC refrigerants and oils.

## 2.3 HANGERS

- A. Adjustable Swivel Hanger: Pipe Sizes 2" and Less: Carpenter and Paterson Fig. 800 conforming to MSS-SP-58, oversize for insulated piping systems. Pipe Sizes Larger Than 2": Carpenter and Paterson Fig. 100, oversize for insulated piping systems.
- B. Riser Clamp: Carpenter and Paterson Fig. 126 and Fig. 126 CT conforming to MSS-SP-58, provide copper plated clamps on copper pipes.
- C. Insulation Shields: 18 ga. galvanized steel, 180° wrap, Carpenter and Paterson Fig. 265P, Type H.

## 2.4 VALVES

- A. Ball Valves: Apollo 77-100 (threaded) or 77-200 (solder), bronze body, full port, Fed. Spec. WW-V-35, Type II, Class A (bronze), Style 3, blow-out proof stem, 600 pound W.O.G., screwed connection for steel pipe, sweat connection for copper tube. Provide stem extension to allow operation without interfering with pipe insulation. Provide Tee handles for valves thru 2" pipe size.
- B. Gate Valves: Nibco Model S-113 or T-113, bronze body Fed. Spec. WW-V-54, wedge disc, rising stem, screwed connection for steel pipe, sweat connection for copper tube, 150-pound class.
- C. Check Valves: Nibco Model S-413 or T-413, bronze body Fed. Spec. WW-V-51, regrinding swing check type, 200 pound class.

## 2.5 PIPING, VALVE AND EQUIPMENT IDENTIFICATION

- A. Pipe Identification: Provide plastic "wrap around" identification markers indicating flow direction and fluid flowing for the following:

Hot Water Supply Piping  
Hot Water Return Piping

- 1. Markers shall be placed 30-50 ft. apart for piping in accessible areas.
- 2. Markers shall be placed outside the pipe insulation and in the most obvious location for viewing. Markers shall not be installed in exposed areas except in the mechanical rooms.

- B. Valve Tags:

- 1. Attach to each valve a 1-1/2" round or octagonal brass tag with 1/2" indented numerals filled with a durable black compound. In addition to

the valve numbers, each tag shall identify the system it controls. Service stop valves exposed in finished areas need not be tagged.

2. Tags shall be securely attached to stems of valves with copper or brass "S" hooks, or chains.
3. Valve charts shall be provided for each piping system and shall consist of schematic drawings of piping layouts, showing and identifying each valve and describing its function. Upon completion of the work, one (1) copy of each chart, sealed to rigid backboard with clear lacquer placed under glass and framed, shall be hung where directed. Two (2) additional unmounted copies shall be delivered to the Architect.
4. Tags and charts shall be coordinated with Section 23 00 00 Heating System and when completed this work shall have been done sequentially.

C. Equipment Identification:

1. Provide laminated plastic nameplates for boilers, pumps, and air handling units. Laminated plastic shall be 0.125-inch thick melamine plastic conforming to Fed. Spec. L-P-387, black with white center core. Surface shall be a matte finish, corners shall be square. Accurately align lettering and engrave into the white core. Minimum size of nameplates shall be 1.0 inch by 2.5 inches. Lettering shall be minimum of 0.25-inch high normal block lettering.

## 2.6 HYDRONIC SPECIALTIES

- A. Thermometers: Trerice Model V80445 or Ashcroft Series 600A-04, dial type, Mil Spec MIL-T-9955, 4-1/2" diameter face. Hot water system thermometers shall have a range of 30°F to 240°F with 2° increments. Provide with brass thermometer wells projecting a minimum of 2" into the pipe with extension to face of insulation. Provide with heat transfer fluid to fill the sealed interstitial space between bulb and well. Evidence of the transfer fluid leaking shall be cause for refilling and sealing the well.
- B. Pressure Gauges: Trerice Series 800 or Ashcroft Type 1005, Grade B, ANSI B40.1, 3-1/2" diameter face installed with shut off petcock and restrictor. Pressure range: 0-50 psig with 5 psi graduations, 0-100 psig with 10 psi graduations for chilled water pumps.
- C. Strainers: Watts Model 77S, MIL-S-16293, 125 psig minimum rating wye strainers, cast iron or bronze body, screen shall be stainless steel, monel or bronze with 20 mesh perforations. Provide with blowdown ball valve and 3/4" hose connection.
- D. Automatic Air Vents: Armstrong No. 1-AV, float type to vent air in hydronic systems. Vent constructed with cast iron body and stainless steel internals and with NPT male inlet and outlet for 1/4 inch overflow for safe water connection. 150 psi working pressure, 250°F maximum temperature.

- E. Manual Air Vents: Brass body, fiber discs, 125 psi working pressure, 240°F maximum temperature, adjustable for quick venting at system start-up.
- F. Manual Circuit Balance Valves: Taco "Accu-Flo".
  - 1. Bronze or brass body and internals, teflon seats, 300 psi working pressure, 250°F working temperature. Balancing devices shall be adjustable and shall have provisions for connecting a portable differential pressure gauge. Each balancing device shall be sized to provide a differential pressure reading between 2 and 5 feet with the valve full open at design flow rates.
  - 2. Install per manufacturer's recommendations for adjacent length of straight pipe.
  - 3. Shop drawings shall indicate gpm, size, wide open differential pressure meter reading, and actual water pressure drop.
- G. Temperature and Pressure Test Ports: Peterson Equipment Co. Model 110 "Pete's Plugs" temperature and pressure test capability, brass body, 1/4" NPT fitting, Nordel valve cores, 275°F maximum temperature, 500 psig maximum pressure. Provide with (1) pressure and temperature test kit.
- H. Automatic Flow Control Valves: Belimo (ONLY). The valves shall be factory set to maintain the specified flow rates within +/- 5% over an operating range of 2-32 psid. Each valve shall have a five (5) year warranty and free first year cartridge exchange. The internal wear surfaces of the valve cartridge shall be electroless nickel or stainless steel. The valve body shall be forged brass and permanently marked with the flow rate and spring range. Minimum pressure and temperature ratings shall be 400 psig at 250°F. Valve accessories shall include a union, ball valve and integral strainer. Installation shall be in accordance with the manufacturer's recommendations. The ball valve shall have a teflon packing, brass packing nut and blowout-proof stem, large diameter plated ball and a full size steel handle with vinyl grip.

## 2.7 WALL HEATER (WH-#)

- A. Wall heaters shall be Smith's Environmental (model PWU or PSU as scheduled), Beacon Morris or equal. Heating capacity shall be as scheduled. Voltage shall be 120V., UL-listed, 5.0A. Furnish with low temperature aquastat and disconnect switch. Wall heaters shall be recessed.

## 2.8 TOTAL ENERGY HEAT RECOVERY EQUIPMENT (ERV-#)

- A. Shall be Renewaire or approved equal, with capacities and performance as scheduled. The heat recovery equipment shall be a factory assembled and tested package, constructed and rated in accordance with ARI, AMCA and UL. System components shall include fan(s), air-to-air energy recovery core or wheel, low-leakage dampers, variable frequency drives (except where ECM motors are

scheduled), DX cooling coil, electric heating coil, as scheduled), filter sections, stainless steel sloped drain pans, motor starters, defrost system, welded structural steel base, packaged controls, non-fused disconnect switches and insulated airtight casing with interior sheetmetal liner. The casing shall be double-wall with 2" insulation having an R-value of R-13 or greater.

- B. Fans shall be DWDI forward curved or airfoil blade or plenum fan with factory mounted variable frequency drives. Motors shall be mounted on an adjustable slide base. Motors shall be premium high efficiency, inverter-duty rated with variable speed drives. Fan bearings shall be re-greasable tapered roller pillow block bearings with an L10 life of 200,000 hours. Provide extended lubrication lines for each bearing. Fans shall have seismic rated 2" static deflection spring vibration isolators. All serviceable components shall be readily accessible via hinged (stainless steel) and latched fully gasketed quick release access doors.
- C. Supply and exhaust prefilters shall be 2" thick, 30-35% efficient extended surface pleated media disposable type by Farr, or approved equal. Furnish a total of three (3) complete sets of filters for each filter bank. Provide Dwyer "Magnehelic" differential air pressure gauges across each filter bank.
- D. Drain pans shall be insulated double-sloped stainless steel with drain connections. Provisions shall be made for bypassing the heat exchanger, reducing the speed of the wheel or otherwise reducing the recovered heat on a call for cooling of the supply airstream (economizer cycle).
- E. Dampers shall be galvanized steel, airfoil blade, Ruskin Model CD60, or approved equal, "ultra low leak" type. Blade seals shall be neoprene and jamb seals shall be compressible aluminum or stainless steel. Motorized backdraft dampers and actuators with end switches shall be provided for the supply and exhaust fans.
- F. Coils: Capacities and pressure drops shall be rated in accordance with ARI 410. Coils shall be pressure tested at 300 psig and shall be suitable for 150 psig service.
  - 1. Cooling Coils: Copper tubes, aluminum fins and copper headers. Casings shall be 16 gage galvanized steel.
- G. Electrical work shall be in accordance with the National Electrical Code (NFPA 70) and shall include motor starters, junction boxes, duplex weatherproof GFCI receptacles, and vapor-tight marine lights in each compartment. Provide switches with pilot lights. Wiring shall be in galvanized steel or liquid-tight conduit. A single point electrical connection shall be provided.
- H. Packaged stand-alone microprocessor controls shall include the following: enthalpy economizer controller, wheel rotation sensor (where applicable), electric preheat wheel frost control (where applicable), discharge air sensor, dirty filter sensor for outdoor and exhaust filters, modulating wheel, dehumidification mode and discharge air temperature control. Provide each unit with remote monitoring panel and 150ft of cabling.

- I. The heat recovery unit shall be started up and operation verified by an authorized representative of the equipment manufacturer and the commissioning agent during the commissioning process.

2.9 HYDRONIC DUCT COILS (HC): Coils shall be copper tube with aluminum fins and copper headers with 16ga galvanized steel casings. Capacities and pressure drops shall be as scheduled and shall be rated in accordance with ARI 410. Coils shall be pressure tested at 300 psig and shall be suitable for 150 psig service.

## 2.10 CABINET UNIT HEATERS

### A. Construction:

1. Cabinet unit heaters shall be manufactured by the Trane Co., Sterling, Vulcan or American Air Filter. Unit configuration shall be inverted airflow, wall-mounted or floor-mounted as indicated. Cabinets shall be surface-mounted, semi-recessed or fully recessed, as indicated. Coils shall be copper tube mechanically expanded into aluminum fins and pressure rated at 200 psig at 250°F. Fans shall consist of multiple squirrel cage blowers on a common shaft. Coils shall be certified in accordance with ARI Standard 410. Casings shall be galvanized steel. Cabinets shall be finish painted in a factory-applied baked enamel with color selection by the Architect.
2. Furnish units with a 3-speed fan switch, disconnect switch and throwaway dust filter (with 2 spare sets per unit).

### B. Performance:

1. Performance and capacity shall be as scheduled.

## 2.11 RANGE HOOD (KH-1)

- A. Denlar D1030-D-IF-NFPA101 or Greenheck GRRS, UL-listed "Fire Ready" with residential grade wet chemical fire suppression system used in a commercial space, 30" wide, NFPA-101 compliant. Construction shall be 18 and 20 gauge Type 304 stainless steel with ducted fan (500 CFM). The hood system shall be furnished with commercial grade grease extracting baffle filters with grease trough and removeable grease cup. Shatter proof light fixtures shall be included. Hood controls shall be mounted 48" AFF and in compliance with ADA requirements.
- B. The system shall be interconnected with a shunt trip breaker to shut off power to the cooking equipment if a fire occurs. The system shall comply with ADA requirements and NFPA101, "Life Safety Code". The hood shall have a keyed switch for operational lock-out ("ClockBox") and auxiliary contacts to notify the Fire Alarm system.

## 2.12 SPLIT SYSTEM VRF AIR CONDITIONING UNITS – SERVING SPACES (SAC-#, SCU-#)

- A. The Split System Heat Pump Air Conditioning Systems shall be or Mitsubishi Y-series High Efficiency-Series (VRF, Variable Refrigerant Volume) or equal by Daikin or Lennox, consisting of multiple refrigeration coil interface kits (LEV) served by outdoor heat pump units. Performance and capacities shall be as scheduled. Submittals shall include output from factory selection software indicating that scheduled outdoor ambient temperature, indoor conditions, connected indoor units, refrigerant line lengths and a 5% defrost have been accounted for and shall be capable of heating to -15°F. The system shall utilize R-410A refrigerant. Branch Controllers and piping joints shall be provided as required and furnished with isolation ball valves for each refrigerant line. Piping joints and headers in the refrigeration piping shall be manufactured by the system manufacturer, piping shall be type nitrogen-purged ACR Copper. The split systems shall include packaged controls including duct sensors for each LEV kit. Outdoor unit power shall be 208V, 3-phase.
- B. The outdoor heat pump units shall be the model and capacity scheduled. Compressors shall be inverter-driven scroll type. Capacity shall match system load. Heat exchanger shall be a copper pipe-in-pipe structure, unit shall include a high pressure sensor and switch, inverter overcurrent/overheat protection, compressor overheat protection, auto-defrost mode. Outdoor units shall be set on the roof on 24" tall prefabricated galvanized equipment supports. Furnish with snow / hail guards and base pan heaters. Units shall be securely fastened to the stands which shall be securely mounted to the roof structure. Start-up shall be by an authorized representative of the manufacturer.
- C. LEV kits shall be provided for connection to ERV DX-coils and for control of refrigerant flow to the coils. (Outdoor units serving LEV kits shall be Y-Series non-heat recovery).
- D. Submittal shall include corrected performance values from the manufacturer's selection software accounting for outdoor air temperature, indoor conditions, line lengths, elevation of components and defrost cycle. Submittals consisting of generic cut sheets with nominal performance only shall be rejected.

## PART 3 EXECUTION

### 3.1 SURFACE CONDITIONS

- A. Inspection:
  - 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
  - 2. Verify that the heating system may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

### 3.2 INSTALLATION OF PIPING

- A. In general, piping shall be run concealed above ceilings in occupied areas. Piping in other areas may be run exposed. Piping shall not be exposed in occupied spaces unless written authorization is given by the Architect.
- B. Provide and erect in accordance with the best practice of the trade piping shown on the Drawings and as required to complete the intended installation. Make offsets as shown or required to place piping in proper position to avoid other work and to allow the application of insulation and finish painting to the satisfaction of the Architect.
- C. The size and general arrangements, as well as the methods of connecting piping, valves, and equipment, shall be as indicated, or so as to meet the requirements of the Architect.
- D. Piping shall be erected so as to provide for the easy and noiseless passage of heating fluid under working conditions. Inverted eccentric reducing fittings shall be used whenever water pipes reduce in size.
- E. Install stop valves and unions to facilitate isolation and removal of equipment. Provide final connections for hydronic specialties furnished under other sections of the Specifications.
- F. Solder joints shall be made with non-lead solder. Clean surfaces to be soldered and use a paste flux. Wash joints with sodium bicarbonate and water to remove corrosive effects of heated solder paste. Hot wipe solder at each fitting.
- G. Pipe penetrations through walls, floors and ceilings shall be in accordance with Section 23 05 00 "Supplemental Mechanical General Requirements". Traverse points of piping shall be escutcheoned with split chrome floor and ceiling plates and spring anchors, where visible to occupancy.
- H. All vertical and horizontal penetrations through walls, floors and ceilings shall be sealed against air movement between spaces.

### 3.3 PIPE HANGERS

- A. Impact driven studs are not acceptable.
- B. Pipes (copper or steel) shall be supported at intervals and rod sizes as follows, double nuts on hangers and on beam clips.

Pipe Size	Hanger Intervals	Rod Sizes
1/2"	5'	3/8"
3/4"	6'	3/8"

- C. Verticals: Supported at the base and at intervals as follows by use of clamp hangers:

Copper Pipe and Tubing:

1-1/2" and larger - Not more than 12 ft.

1-1/4" and smaller - Not more than 6 ft.

- D. Provide welded steel saddles at each hanger on steel piping systems 4" and larger.

3.4 CLOSING IN WORK

- A. Cover up or enclose work after it has been properly and completely tested and reviewed.
- B. No additional cost to the Owner will be allowed for uncovering or recovering any work that is covered or enclosed prior to required test and review.

3.5 TEST AND ADJUST

- A. Piping Systems: Test with water to a pressure of 75 psi and hold for a period of two hours. Repair any leaks and retest the piping system; repeat process until systems are leak-free. Test piping before it is insulated.
- B. Before operating any system, flush the piping to remove oil and foreign materials.
- C. After the installation is complete and ready for operation, test the system under normal operating conditions in the presence of the Architect and demonstrate that the system functions as designed.
- D. Demonstrate that the HVAC systems have free and noiseless circulation of water, that all air has been purged and that systems are watertight.
- E. Correct defects which develop in operational testing, conduct additional testing until defect free operation is achieved.
- F. Provide balancing and adjusting of terminal devices in accordance with Specification Section 23 05 93.

3.6 CLEANUP AND CORROSION PREVENTION

- A. Piping and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- B. Before covering is applied to piping systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces. When corrosion is from the effects of hot solder paste, the areas shall be cleaned and polished and a wash of bicarbonate of soda and water used to neutralize the acid condition.

### 3.7 INSTRUCTIONS

- A. On completion of the project, instruct the Owner's representative in the care and operation of the system. The period of instruction shall be for not less than one 8 hour period. The time of instruction shall be arranged with the Owner. In addition to the prime Mechanical Contractor, the control system Contractor, Balancing Contractor, and Owner's representative shall be present and participate in the Owner's instruction.

### 3.8 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

\* END OF SECTION \*

## **SECTION 230500 - SUPPLEMENTAL MECHANICAL GENERAL REQUIREMENTS**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The General Conditions, Supplemental General Conditions and Instructions to Bidders shall apply to this work. Read these to be familiar with conditions related to the installation of the work.
- B. Coordinate with Section 01 91 00 Commissioning.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.
- D. Provision of waste management: Section 01 74 19, Construction Waste Management and Disposal.

#### **1.2 WORK SHOWN ON DRAWINGS**

- A. The drawings accompanying this specification, as a part thereof, are working drawings indicating the location and arrangement of the increments of the systems of this section of work. Material deviation from this arrangement, process or means of application, shall bear the Engineer's review stamp before the change is made on the job or materials are ordered. Changes made without such review shall be ordered removed and items installed as specified shall be provided at no additional expense to the Owner.
- B. The drawings are not intended to show in minute detail minor items of installation or materials such as specific fittings or findings.

#### **1.3 MATERIALS AND LABOR**

- A. Furnish materials and labor necessary to deliver to the Owner a complete and operable system installed in accordance with the contract documents.
- B. Materials shall be of the best quality. Workmanship shall be of highest grade and construction shall be done according to best practices of the trade.
- C. Provide, when required, labeled samples of material or equipment specified herein or proposed to be used in this work.
- D. Where words "furnish", "provide", or "install" are mentioned, either singly or in combination, these words are hereby interpreted to mean "furnish and install" or "provide and install", including materials complete with connections, supplemental devices, accessories and appurtenances, unless specifically otherwise noted. These words are likewise hereby interpreted as being prefixed to materials, equipment, and apparatus hereinafter mentioned, either in abbreviated or scheduled information or in the technical sections of the specifications.

#### 1.4 EQUIPMENT INSTALLATION IN HEATING SEASON

- A. The system shall be installed such that the construction area will have sufficient heat to maintain temperature above 40°F throughout the construction period.
- B. Coordinate with section 01 50 00 Temporary Facilities.

#### 1.5 COOPERATION BETWEEN TRADES

- A. Provide information sufficiently in advance of this work, so that work by the other trades may be coordinated and installed without delays. Furnish and locate sleeves, supports, anchors and necessary access panels.
- B. Where work is concealed, assure it does not project beyond finished lines of floors, ceilings, or walls.
- C. Equipment or piping requiring access found to be located above sheetrock ceilings shall be brought immediately to the attention of the Architect for resolution.

#### 1.6 VISITING THE PREMISES

- A. Visit the premises and review the existing conditions, as applicable.

#### 1.7 ORDINANCES, AUTHORITIES, PERMITS, AND FEES

- A. Obtain necessary permits and licenses, give notices and comply with laws, ordinances, rules, regulations or orders affecting the work, and pay fees and charges in connection therewith.
- B. The "authority having jurisdiction" is the organization, office, or individual responsible for "approving" equipment, an installation, or a procedure.

#### 1.8 PROTECTION OF WORK AND MATERIALS

- A. Protect and care for materials delivered and work performed until the completion of the work. Defective equipment or equipment damaged in the course of storage, installation or test shall be replaced or repaired to the satisfaction of the Engineer at no additional cost to the Owner.

#### 1.9 INSURANCE

- A. Purchase and maintain Public Liability and Property Insurance during the progress of the work and until completion and acceptance of the entire project by the Owner in the amounts as specified in the General Conditions.

#### 1.10 APPLICABLE CODES

- A. Work and materials shall conform to the latest rules and regulations listed below and these rules and regulations hereby are made part of this specification. They include, but are not necessarily limited to the following:

American Society for Testing and Materials (ASTM)  
Underwriters' Laboratories, Inc. (UL)  
Air Moving and Conditioning Assoc. (AMCA)  
American Society of Heating, Refrigerating, and Air  
Conditioning Engineers (ASHRAE)  
American Society of Mechanical Engineers (ASME)  
National Electrical Manufacturers Association (NEMA)  
Institute of Electrical and Electronics Engineers (IEEE)  
American National Standards Institute (ANSI)  
National Fire Protection Association (NFPA)  
American Water Works Association (AWWA)  
Local Fire Code  
Local Plumbing Codes  
American Welding Society  
Maine Uniform Building and Energy Codes (MUBEC)

#### 1.11 SHOP DRAWINGS

- A. Submit shop drawings, manufacturers' data and certificates for equipment, materials and finish, and pertinent details for each system where specified in each individual section, to be submitted to the Architect. Shop drawings will be returned "No Exceptions Taken", "Make Corrections Noted", "Amend and Resubmit", "Submit Specified Item", or "Rejected". Work shall progress in accordance with "Reviewed" shop drawings (ONLY).
- B. Shop drawings that are facsimiled, (FAX) produced, or photocopies of FAX documents will not be considered or reviewed. Only originals and or photocopied originals, or PDF files complying with this section will be considered. Submittals that include illegible pages will be rejected.
- C. Groups of similar shop drawings shall be submitted as individual bound documents with covers and indexes. Submittals shall be grouped by specification section and major paragraph number (ie 2.1, 2.2, 2.3, etc) in a separate submittal (file) and shall include all items under that paragraph. Submittals shall not include items from multiple major paragraphs and shall be rejected without review if they do (the exception to this is that Automatic Temperature Controls may be submitted as a single submittal, Automatic Fire Protection (sprinkler) may also be submitted as a single submittal.) Rejection of individual items shall not be cause for rejection of the entire document.
- D. Clearly indicate item(s) to be reviewed on each submission by **highlighting**, underlining or indicating with arrows, the intended item(s). All proposed options and accessories shall be clearly marked to identify what is to be provided. Submissions not clearly marked shall be returned "Amend and Resubmit".
- E. Shop drawings must bear the Engineer's review stamp. In the event that the Engineer returns shop drawings "Amend and Resubmit" or "Rejected", the shop drawing must be revised and resubmitted for review.

- F. Furnishing of the specified item must still produce the results and performance, dependability and quality reasonably to be expected within the spirit of the specifications, drawings, and the standard of good mechanical performance normal to the trade.
- G. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- H. Product Data: Submit data on product characteristics, performance criteria and limitations.
- I. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- J. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

#### 1.12 SUBSTITUTIONS

- A. Where the specifications allow the substitution of a product, still this product is subject to review by the Engineer in accordance with the paragraph entitled "Shop Drawings". Review of a substitute item is an indication only that the substitute item is compatible with the specified item as a claim of the manufacturer. Insure dimensional propriety, performance, and quality of the substitute item.
- B. Reference in the specifications or on the drawings to any product, material, fixture, form or type of construction, by proprietary name, manufacturer, make or catalog number, establishes a standard of quality or design and is not meant to limit competition. Use any equivalent substitute provided favorable written review by the Engineer is first obtained. The (ONLY) notation in the specification is an exception to this and leaves no option.
- C. For materials or equipment which are supplied with integral or factory applied finish, the colors will be considered in evaluating substitutions.
- D. For the purpose of avoiding conflicts with other trades, contracts, and adjoining work where more than one (1) article, device, material, fixture, form or proprietary name, manufacturer, make or catalog number, the first named shall be used as the basis of design and details. The cost of any changes because of substituted item shall be borne by the Contractor requesting such change.

#### PART 2 PRODUCTS

NOT USED

#### PART 3 EXECUTION

##### 3.1 EQUIPMENT SUPPORTS

- A. Furnish and install equipment supports for mechanical equipment as required. Supports shall be subject to review by the Engineer.

### 3.2 SLEEVES AND PREPARED OPENINGS

- A. Coordinate cutting, patching and setting of sleeves, frames, framing and lintels for openings with other trades. Sleeves shall be furnished by the Contractor. All penetrations through concrete shall be sleeved as required by IBC.
- B. Failure to give timely notice of and to locate openings and furnish sleeves shall cause no additional expense to the Owner.

### 3.3 CONNECTION TO EQUIPMENT

- A. Provide piping connections, supports, brackets, compensators or flexible connections to prevent application of excessive stresses to equipment.
- B. Equipment shall be installed with flanges or unions in such a manner as to permit disconnecting for removal of tubes, coils, elements and other equipment for inspection, service and repairs.

### 3.4 ACCESS TO EQUIPMENT

- A. The installation of work performed shall provide reasonable accessibility for operation, inspection, and maintenance of equipment and accessories. The Engineer shall determine the adequacy of such accessibility.

### 3.5 ACCESS PANELS

- A. Access panels shall be provided where indicated on the drawings and as required for access to fire dampers, smoke dampers, valves and other serviceable components.
- B. Access panels installed in fire-rated assemblies shall have the same fire rating as the assembly.

### 3.6 PAINTING OF EQUIPMENT

- A. Exposed ironwork, including steel supports and hangers in unfinished spaces, mechanical rooms, pits, and trenches shall be properly cleaned, prepared and painted with two (2) coats of black asphaltum varnish.

### 3.7 GUARDS

- A. Exposed moving and rotating elements of mechanical equipment items shall be protected with suitable guards for personnel protection. Guards shall be of rigid construction, firmly positioned. Holes shall be provided in guards at shaft centers to facilitate tachometer readings.

### 3.8 LUBRICATION

- A. Furnish and install grease fittings for points requiring lubrication. Furnish extension type fittings as required to provide easy access for maintenance lubrication.

- B. Furnish initial charges of lubricants for equipment. Lubricants shall be in conformance with the manufacturer's requirements and recommendations.

### 3.9 ELECTRIC MOTORS AND MOTOR CONTROLS

- A. Unless otherwise noted, motors, motor starters and other electrical accessories which are specified under Mechanical specifications shall be selected with characteristics as follows:

1/2 Horsepower and less - 120 volt, 1 phase, 60 Hz.  
3/4 Horsepower and greater - 208 volt, 3 phase, 60 Hz.

- B. Motors shall be built in accordance with the latest applicable NEMA, IEEE and ANSI Standards. Motors shall be of the latest type and quality specified under individual items of equipment.
- C. Magnetic motor starters for mechanical items of equipment shall be furnished under Division 26 unless the starter is an integral part of a factory packaged item of equipment. Each starter furnished as an integral item of equipment shall be provided with overload heater elements. Starters shall have single phase protection or shall have relays installed to provide this feature. Starters shall be equipped with suitable step-down transformers to provide required control voltage.
- D. Motors shall have a minimum continuous duty service factor of 1.15. Minimum motor efficiency shall be:

<u>MOTOR HORSEPOWER</u>	<u>PERCENTAGE EFFICIENCY</u>		
	<u>(1200RPM)</u>	<u>(1800 RPM)</u>	<u>(3600 RPM)</u>
1,1-1/2,2,3	----	78.0	76.0
5	87.4	87.4	86.3
7.5	89.4	89.8	87.7
10	89.7	90.3	89.0

### 3.10 EXISTING CONDITIONS

- A. The Contractor shall be responsible for correcting any damage to existing systems, components or utilities that are to remain in service.
- B. The Contractor shall visit the premises and review Architectural, Structural and Civil drawings to become familiar with the existing conditions prior to submitting a bid. No additional compensation will be allowed for existing conditions that are readily apparent during a site visit.

### 3.11 EXISTING UTILITIES AND SERVICES

- A. Existing building shall remain in use throughout construction. All existing utilities must remain in service.
- B. Owner shall be provided with 14 day advance notice for all utility/service shutdowns.

### 3.12 CLEANING OF SYSTEMS

- A. Piping systems shall be thoroughly cleaned and flushed prior to initial operation.
- B. Thoroughly clean exposed portions of the mechanical installation, removing labels and foreign substance.
- C. Furnish detergents, solvents, cleaning compounds, and tools required for cleaning operations.
- D. Keep the premises free from accumulation of waste material or rubbish and at the completion of the work, remove from the job site tools, scaffolding, surplus materials, and rubbish, leaving the work areas "broom" clean.

### 3.13 STARTING OF EQUIPMENT

- A. Testing or starting of equipment shall be done in collaboration with trades concerned to insure safe and proper operation of the equipment.
- B. Prior to starting equipment, provide lubrication at required points. Before starting any electrical or electric motor driven equipment, a check must be made to insure that proper heater coils are installed in the starters and that the equipment is rotating in the proper direction.

### 3.14 OPERATIONAL TESTING

- A. Operate systems until successful operation is demonstrated to the Engineer. This initial operation shall be in addition to the testing of the system and shall be done after the system is cleaned and finished.

### 3.15 RECORD DRAWINGS

- A. During construction, keep an accurate record of deviations to the installation of the work as indicated on the drawings. Upon completion of the work, furnish a copy of this record to the Engineer. **Submit record drawings before requesting final payment.**

### 3.16 MANUFACTURER'S REPRESENTATIVE

- A. As indicated in the Technical Sections of this specification or as directed by the Engineer, provide the services of a factory trained Engineer or Technician to inspect, adjust, and place in proper operating condition the equipment or item involved. No additional compensation will be allowed for such service.

### 3.17 MANUFACTURER'S INSTRUCTIONS, OPERATION AND MAINTENANCE DATA

- A. Provide for each item of equipment or apparatus furnished, a complete set of printed instructions obtained from the manufacturer covering proper operation, maintenance, lubrication, cleaning, servicing, adjustment, and safety instructions.

- B. Manufacturer's data shall include performance data (curves are preferred where applicable) complete parts lists, recommended spare parts lists, piping, and wiring diagrams.
- C. Arrange data in complete sets, properly indexed and marked.
- D. Data shall include a complete set of shop drawings.
- E. Material shall first be submitted in preliminary form for review by the Engineer. After review, submit two (2) copies in bound volumes to the Engineer for distribution.

### 3.18 GUARANTEES

- A. An item becomes "defective" when it ceases to conform to the Contract Documents. Guarantees begin on the date of issuance of a certificate authorizing final payment or certificate of substantial completion with the Owner taking occupancy or beneficial use thereafter.
- B. Upon completion of the work and before applying for final payment, furnish a written guarantee, stating that the work complies with the provisions of codes listed herein and the local enforcing authorities, and that it will be free from defects of material and workmanship for not less than one (1) year. Guarantee shall further state that the Contractor will, at his own expense, repair or replace any of his material and work which may become defective during the time of guarantee, together with other work damaged as a consequence of such defects.
- C. Repeated malfunctioning or failure in service of any item or work of the system is sufficient cause for the Engineer to order the removal of the item, and its replacement with new item at the expense of the Contractor.

### 3.19 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 Firestopping. All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

\* END OF SECTION \*

## **SECTION 230593 - TESTING AND BALANCING AIR SYSTEMS**

### **PART 1 GENERAL**

#### **1.1 DESCRIPTION**

- A. The work covered by this section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required for testing and balancing the air systems.

#### **1.2 RELATED DOCUMENTS**

- A. The provisions of Section 23 05 00, "Supplemental Mechanical Requirements", apply to this section.
- B. Coordinate with Section 01 91 00 Commissioning.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.
- D. Provision of waste management: Section 01 74 19, Construction Waste Management and Disposal.

#### **1.3 DEFINITIONS**

- A. Adjust: To regulate the specified fluid flow rate and air patterns at the terminal equipment, (e.g., reduce fan speed, throttling).
- B. Balance: To proportion flows within the distribution system (submains, branches and terminals) in accordance with specified design quantities.
- C. Procedure: Standardize approach and execution of sequence of work operations to yield reproducible results.
- D. Report Forms: Test data sheets arranged for collection of test data in logical order to submission and review. This data should also form the permanent record which shall be used as the basis for any future testing, adjusting, and balancing required.
- E. Test: To determine quantitative performance of equipment.

#### **1.4 SUBMITTALS: Submit the following:**

- A. Standards Compliance:
  - Testing Agency
  - Testing Agency Personnel
  - Professional Engineers
  - Instrument Calibration

- B. Section 01330 - Submittal Procedures: Submittal procedures.
- C. Product Data: Submit data on product characteristics, performance criteria and limitations.
- D. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

#### 1.5 TESTING AND BALANCING AGENCY

- A. Air Systems Testing and Balancing: Upon completion of the installation and field testing, performance test and adjust the supply, return, make-up, and exhaust air systems, and heating water systems to provide the air volume and water flow quantities indicated. Accomplish work in accordance with the agenda and procedures specified and AABC 71679 and standards of the NEBB. Correct air and water system performance deficiencies disclosed by the test before balancing the systems.
- B. Agency Qualifications: Obtain the services of a qualified testing organization to perform the testing and balancing work as herein specified. Prior to commencing work under this section of the specifications, the testing organization shall have been reviewed by the Architect and Engineer. The criteria for determining qualifications shall be membership in the AABC, or certification by the NEBB, or the testing organization shall have submitted proof to satisfy the Architect and Engineer that the organization meets or exceeds the technical standards for membership of the AABC as published in the AABC 71679. The testing organization shall be independent of both the installing contractors and equipment suppliers for this project.

#### 1.6 AGENDA

- A. Preliminary Report: Review drawings and specifications prior to installation of any of the affected system. Submit a written report to the Architect indicating any deficiencies in the system that would preclude the proper adjusting, balancing, and testing of the systems.

#### 1.7 PROCEDURES, GENERAL

- A. Requirements: Adjust systems and components thereof that perform as required by drawings and specifications.
- B. Test Duration: Operating tests of heating and cooling coils, fans and other equipment shall be of not less than 4 hours duration, after stabilized operating conditions have been established. Capacities shall be based on temperatures and air and water quantities measured during such tests.
- C. Instrumentation: Method of application of instrumentation shall be in accordance with the manufacturer's instructions. Furnish personnel, instruments, and equipment for tests specified herein.

- D. Accuracy of Instruments: Instruments used for measurements shall be accurate. Provide calibration histories for each instrument for examination. Calibrate each test instrument by an reviewed laboratory or by the manufacturer. The Architect has the right to request instrument recalibration, or the use of other instruments and test methodology, where accuracy of readings is questionable.
- E. Accuracy of Thermometers: Plus or minus one graduation at the temperatures to be measured. Graduations shall conform with the following schedule:

Medium	Design Temperature Differential (°F)	Maximum Graduation (°F)
Air	10 or less	1/2
Air	over 10	1

- F. Flow Rate Tolerance: Values are based on discussion in ASHRAE "HVAC Applications", Chapter 34. Air filter resistance during tests, artificially imposed if necessary, shall be 80 percent of final values.
1. Air Handling Unit CFM: Minus 0 percent to plus 10 percent.
  2. Other Fans: Minus 0 percent to plus 10 percent.
  3. Air Terminal Units (VAV Boxes): Minus 5 percent to plus 10 percent.
  4. Minimum Outside Air (for manually set dampers): Minus 0 percent to plus 10 percent.
  5. Individual Room Air Outlets and Inlets, and Air Flow Rates Not mentioned Above: Minus 10 percent to plus 10 percent.

## PART 2 PRODUCTS

### NOT USED

## PART 3 EXECUTION

### 3.1 AIR SYSTEM PROCEDURES

- A. Adjustments: Adjust air handling systems to provide the required design air quantity to, or through, each component. Conduct adjusting and balancing of systems during periods of the year approximating maximum seasonal operation.
- B. Balance: Use flow adjusting (volume control) devices to balance air quantities only; i.e., proportion flow between various terminals comprising system, and only to the extent that their adjustments do not create objectionable air motion or sound, i.e., in excess of specified limits.

- C. Balancing Between Runs (submains, branch mains, and branches): Use flow regulating devices at, or in, the divided - flow fitting. Minimize restriction imposed by flow regulating devices in or at terminals.
- D. Final Measurements of Air Quantity: Make final measurements of air quantity, after the air terminal has been adjusted to provide the optimum air patterns of diffusion.
- E. Fan Adjustment: Total air system quantities, generally, shall be varied by adjustment of fan speeds, or axial-flow fan wheel blade pitch. For systems with direct-connected fans (without adjustable pitch blades), damper restrictions of a system's total flow or variable speed rheostats shall be adjusted as appropriate.
- F. Air Measurement:
  - 1. Pitot Tube: Except as specifically indicated herein, make pitot tube traverses of each duct to measure air flow therein. Pitot tubes, associated instruments, traverses, and techniques shall conform with the ASHRAE Handbook Fundamentals.
  - 2. Pitot Tube Traverse: Pitot-tube traverse may be omitted if the duct serves only a single room or space and its design volume is less than 2000 cfm. In lieu of Pitot-tube traverse, determine air flow in the duct by totalling volume of individual terminals served, measured as described herein.
  - 3. Measurements of Air Quantity: Where duct's design velocity and air quantity are both less than 1000 (fpm/cfm), air quantity may be determined by measurements at terminals served.
- G. Air Terminal Balancing: Measurement of flow rates by means of velocity meters applied to individual terminals, with or without cones or other adapters, shall be used only for balancing.

### 3.2 CERTIFIED REPORTS

- A. Submittal: Submit three copies of the reports described herein, covering air system performance, air motion (fpm), to the Architect prior to final tests and inspection.
- B. Instrument Records: Include types, serial numbers, and dates calibration of instruments.
- C. Reports: Reports shall identify conspicuously items not conforming to contract requirements, or obvious maloperation and deficiencies.
- D. Certification: The reports shall be certified by an independent Registered Professional Engineer who is versed in the field of air and water balancing and who is not affiliated with any firm involved in the design or construction phases of the project.

### 3.3 AIR SYSTEM DATA

- A. Report: The certified report shall include for each air-handling system the data listed below:
1. Equipment (fan or factory fabricated station unit):
    - a. Installation Data:
      - 1) Manufacturer and Model
      - 2) Size
      - 3) Arrangement, Discharge, and Class
      - 4) Motor H.P., Voltage, Phase, Cycles, and Full Load Amps.
      - 5) Location and Local Identification Data
    - b. Design Data: Data listed in schedules on drawings and specifications.
    - c. Fan Recorded (Test) Data
      - 1) C.F.M.
      - 2) Static Pressure
      - 3) R.P.M.
      - 4) Motor Operating Amps.
      - 5) Motor Operating B.H.P.
  2. Duct Systems:
    - a. Duct Air Quantities (Maximum and Minimum) - Main, Submains, Branches, Outdoor (Outside) Air, Total-Air, and Exhaust
      - 1) Duct size(s)
      - 2) Number of Pitot-tube (Pressure) Measurements
      - 3) Sum of Velocity Measurement, excluding pressure measurements
      - 4) Average Velocity
      - 5) Recorded (Test) C.F.M.
      - 6) Design C.F.M.
    - b. Individual Air Terminals:
      - 1) Terminal Identification (Supply or Exhaust, Location and Number Designation)
      - 2) Type Size, Manufacturer, and Catalog Identification
      - 3) Design and Recorded Quantities - C.F.M.
      - 4) Deflector Vane or Diffusion Cone Settings
      - 5) Applicable Factor for Application, Velocity, Area
      - 6) Design and Recorded Velocities - F.P.M. (State "core" "inlet," as applicable)

### 3.4 FINAL TESTS, REVIEW, AND ACCEPTANCE

- A. Capacity and Performance Tests: Make tests to demonstrate that capacities and general performance of air and water systems comply with contract requirements.
- B. Final Inspection: At the time of final review, recheck, in the presence of the Engineer, random selections of data water and air quantities and air motion recorded in the certified report.
- C. Points and Areas for Recheck: As selected by the Architect.
- D. Measurement and Test Procedures: As reviewed for work forming basis of certified report.
- E. Selections for Recheck (specific plus random): In general, selections for recheck will not exceed 25 percent of the total number tabulated in the report.
- F. Retests: If random tests elicit a measured flow deviation of ten percent or more from, or a sound level of 2 Db or more greater than that recorded in the certified report listings, at ten percent or more of the rechecked selections, the report shall be automatically rejected. In the event the report is rejected, systems shall be readjusted and tested, new data recorded, new certified reports submitted, and new inspection tests made.
- G. Marking of Settings: Following final acceptance of certified reports by the Architect, the settings of valves, dampers, and other adjustment devices shall be permanently marked, so that adjustment can be restored if disturbed at any time. Do not mark devices until after final review.

\* END OF SECTION \*

## **SECTION 230700 - INSULATION**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The drawings and the specifications including Section 23 05 00 "Supplemental General Mechanical Conditions" are hereby made a part of the work of this section.
- B. Coordinate with Section 01 91 00 Commissioning.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.
- D. Provision of waste management: Section 01 74 19, Construction Waste Management and Disposal.

#### **1.2 DESCRIPTION**

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to insulate the heating, ventilating, air conditioning, and plumbing systems.

#### **1.3 SUBMITTALS**

- A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section shall be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:
  - 1. Piping insulation.
  - 2. Duct insulation.
  - 3. Equipment insulation.
  - 4. Insulation application schedule.
  - 5. Vapor barrier coating.
- C. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- D. Product Data: Submit data on product characteristics, performance criteria and limitations.
- E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

## 1.4 DEFINITIONS

- A. Finished Spaces: Spaces other than furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels, unless specifically listed below as an unfinished space.
- B. Unfinished Spaces: Mech/Elect Rooms and attic.
- C. Unconditioned Spaces: Spaces exposed to near outside ambient temperatures (attic) and spaces not air conditioned.
- D. Outside: Areas beyond the exterior side of walls or above the roof, unexcavated spaces, and crawl spaces.
- E. Concealed: Not visible in finished or unfinished spaces. For example, above ceilings, below floors, between double walls, furred-in areas, pipe and duct shafts, and similar spaces.
- F. Exposed: Visible from a finished or unfinished space.

## 1.5 MANUFACTURER'S STAMP OR LABEL

- A. Packages or standard containers of insulation, jackets, cements, adhesives, and coatings delivered to the project site for use must have the manufacturer's stamp or label attached giving name of manufacturer, brand, and description of material. Insulation shall be asbestos-free.

## 1.6 FLAME SPREAD AND SMOKE DEVELOPED RATINGS

- A. Materials shall have a flame-spread rating of not more than 25 and a smoke developed rating of not more than 50 when tested in accordance with NFPA 255, ASTM E84, or UL 723.
- B. Provide materials with flame resistant treatments not subject to deterioration due to aging, moisture, high humidity, oxygen, ozone, or heat.
- C. Materials Exempt from Fire-Resistant Rating: Nylon anchors for securing insulation to ducts or equipment.

## PART 2 PRODUCTS

### 2.1 PIPING INSULATION

- A. Fiberglass: Heavy density preformed fiberglass with thermal conductivity of 0.29 Btu-in/hr-ft<sup>2</sup>-°F at 150°F mean temperature. Insulation shall conform to ASTM C547 Class I and shall be suitable for 450°F service. Fitting insulation shall be of same material used for pipe.

1. Insulation Jacket: All service (ASJ) type conforming to Fed. Spec. HH-B-100B Type I. Jacket permeability shall not exceed 0.02 perms (ASTM E96). Pipe fitting jacket shall be factory premolded, one-piece, PVC covers with pressure sensitive taped joints. Jackets in exposed locations shall have a white surface suitable for field painting. Provide vapor barrier as required by service.
- B. Flexible Unicellular: Flexible unicellular with thermal conductivity of 0.27 Btu-in/hr-ft<sup>2</sup>-°F at 75°F mean temperature. Insulation shall conform to ASTM C534, Type I, Tubular and shall be suitable for 200°F service. Fitting insulation shall be of same material used for pipe. Permeability shall not exceed 0.10 perms (ASTM E96). Insulation adhesive shall conform to Mil. Spec. MIL-A-24179A, Type II, Class 1.
- C. Fittings, Flanges, and Valves: Provide insulation for fittings, flanges, and valves premolded, precut, or job fabricated of the same thickness and conductivity as used on adjacent piping.
- D. Insulation Kit: Insulate exposed supply and waste piping at handicapped accessible sinks with fully molded insulation kit. McGuire Products ProWrap, 3/16" thick closed vinyl with anti-microbial additive, 1.02 Btu-in/hr-F<sup>2</sup>-°F thermal conductivity, white color.
- E. Exposed exterior pipe insulation shall have a glossy white PVC jacket with solvent welded seams and joints for a weathertight installation. Insulated and Heat-traced exposed above grade piping located in the unheated Garage Areas shall be jacketed. Exposed insulated piping located in public areas, e.g. the Trash Room within 7'-0" of the finished floor shall be jacketed

## 2.2 EQUIPMENT INSULATION

- A. Fiberglass (Hot Equipment): Semi-rigid fiberglass board conforming to Fed. Spec. HH-I-558B, Form B, Type I. Thermal conductivity shall be 0.32 Btu-in/hr-ft<sup>2</sup>-°F at 150°F mean temperature (ASTM C177), insulation shall be suitable for 650°F service. Insulation jacket shall be "all service" type conforming to Fed. Spec. HH-I-100B Type I or II. Jacket permeability shall not exceed 0.02 perms (ASTM E96).
- B. Flexible Unicellular (Cold Equipment): Flexible unicellular with thermal conductivity of 0.27 Btu-in/hr-ft<sup>2</sup>-°F at 75°F mean temperature. Insulation shall conform to ASTM C534, Type II, sheet and shall be suitable for 200°F service. Permeability shall not exceed 0.10 perms (ASTM E96). Insulation adhesive shall conform to Mil. Spec. MIL-A-24179A, Type II, Class 1.

## 2.3 DUCT INSULATION

- A. Fiberglass (Ductwrap): Fiberglass duct wrap with foil-scrim-kraft facing/vapor barrier, 1.0 lb/cu.ft. density (0.75 lb/cu.ft. for 3" thickness only), 0.29 Btu-in/hr-ft<sup>2</sup>-°F conductivity at 75°F mean temperature, 0.05 permeance rating. Insulation shall meet the requirements of NFPA 90A & B and shall be UL rated. Provide foil-scrim-kraft (FSK) tape.
- B. Fiberglass (Ductboard): Fiberglass insulation board with foil-scrim-kraft facing/vapor barrier, 3.0 lb./CF density, 0.25 Btu-in/hr-ft<sup>2</sup>-°F conductivity at 75°F mean temperature,

0.05 permeance rating. Insulation shall meet the requirements of NFPA 90A and B and shall be UL rated. Provide foil-scrim-kraft (FSK) tape.

- C. Exterior ductwork shall be insulated with 4" (R-12) ductboard with Polyguard "Alumaguard" composite membrane embossed aluminum foil/polymer laminate with rubberized asphalt with acrylic adhesive. Weatherproofing shall be zero perm, self-healing, puncture resistant, UV stable and shall carry a 10 year warranty.

## 2.4 VAPOR BARRIER COATING

- A. Raw (cut) ends of fiberglass pipe insulation shall be finished (protected) with the application of a suitable vapor barrier coating or finishing cement (mastic) to maintain the continuous visual and functional integrity of the insulation jacket. Mastic shall be Childers "Chil-Perm" CP-30, elastomeric resin, or approved equal, applied in accordance with the manufacturer's recommendations.

## PART 3 EXECUTION

### 3.1 SURFACE CONDITIONS

- A. Inspection:
  - 1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
  - 2. Verify that the insulation systems may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

### 3.2 GENERAL

- A. Insulate after system tests have been completed and surfaces to be insulated have been cleaned of dirt, rust, and scale and are dry.
- B. Install insulation with jackets drawn tight and cement down longitudinal and end laps. Do not use scrap pieces where a full length section will fit. Insulation shall be continuous through sleeves, wall and ceiling openings, except at fire dampers in duct systems and pipe penetrations through fire rated assemblies. Extend surface finishes to protect ends, and raw edges of insulation. Apply coatings and adhesives at the manufacturer's recommended coverage per gallon. Individually insulate piping and ductwork. Keep insulation dry during the application of the finish. Bevel and seal the edges of exposed insulation.

C. Unless otherwise indicated, do not insulate the following:

1. Factory pre-insulated flexible ductwork.
2. Factory pre-insulated ductwork, plenums, casings, mixing boxes, and filter boxes.
3. Chrome plated pipes and fire protection pipes.
4. Vibration isolating connections
5. Adjacent insulation
6. ASME stamps, nameplates, access plates
7. Ductwork exposed to view in a normally occupied space.
8. Hydronic specialties: Low water cutoff, relief valves, relief valve discharge piping, pressure reducing valves, and expansion tanks.
9. Unions and flanges at equipment required for frequent service.

### 3.3 PIPING INSULATION

- A. Pipe Insulation (Fiberglass): Place sections of insulation around the pipe and joints, tightly butt into place. Draw jacket laps tight and smooth. Secure jacket with fire resistant adhesive, or factory applied self sealing lap. Cover circumferential joints with butt strips, not less than 3-inches wide, of material identical to the jacket material. Overlap longitudinal laps of jacket material not less than 1-1/2 inches. Adhesive used to secure the butt strip shall be the same as used to secure the jacket laps. Exposed fiberglass shall be coated with vapor barrier coating.
- B. Flanges, Unions, Valves and Fittings Insulation (Fiberglass): Factory fabricated removable and reusable insulation covers. Place factory pre-molded, precut or field-fabricated segmented insulation of the same thickness and conductivity as the adjoining pipe insulation around the flange, union, valve, and fitting abutting the adjoining pipe insulation. Install factory premolded one-piece PVC fitting covers over the insulation and secure by stapling or with metal or plastic tacks made for securing PVC fitting covers and secure with PVC vapor barrier tape.
- C. Pipe Insulation (Flexible Unicellular): Bond cuts, butt joints, ends, and longitudinal joints with adhesive. Miter 90-degree turns and elbows, tees, and valve insulation. Insulate flanges, unions, valves, and fittings.
- D. Where penetrating roofs and exterior walls, insulate piping to a point flush with the underside of the deck or wall and seal with a vapor barrier coating.
- E. Hangers and Anchors: Pipe insulation shall be continuous through pipe hangers. Where pipe is supported by the insulation, provide MSS SP-58, Type 40 galvanized steel shields (16 gage maximum). For fiberglass insulation systems on pipe sizes 2 inches through 3", provide insulation inserts at points of hangers and supports. Insulation inserts shall be of molded glass fiber (minimum 12 pcf). Insulation inserts shall cover the bottom half of the pipe circumference, 180 degrees, and be not less than 4" long. Vapor-barrier facing of the insert shall be of the same material as the facing on the adjacent insulation. Seal inserts into the insulation. Insulation inserts for pipe sizes 4" and larger shall be welded pipe saddles. Install insulation in void area of saddle of same material used on adjacent insulation. For pipe sizes 2" and smaller, insulation inserts for flexible unicellular insulation systems shall be wooden doweling

set on end of length equal to insulation thickness. Seal dowel to insulation with adhesive.

- F. PVC or Metal Jackets: Provide over insulation where subject to abuse. Machine cut jacket to smooth edge of circumferential joints. Overlap metal jacket not less than 2 inches at longitudinal and circumferential joints and secure with metal bands at not more than 9 inch centers. Overlap longitudinal joints down to shed water. Seal circumferential joints with a coating recommended by insulation manufacturer for weatherproofing. Solvent weld PVC jacket system to provide continuous watertight seal.

### 3.4 DUCT INSULATION

- A. Rigid Insulation: Secure rigid insulation by impaling over pins or anchors located not more than 3 inches from joint edges of boards, spaced not more than 12 inches on centers and secure with washers and clips. Spot weld anchor pins or attach with a waterproof adhesive especially designed for use on metal surfaces. Each pin or anchor shall be capable of supporting a 20-pound load. Cut off protruding ends of pins. After installing washers, provide foil-scrim-kraft (FSK) tape to seal break in vapor barrier, tape shall extend 1" minimum around pin. Apply insulation with joints tightly butted. Bevel insulation around name plates and access plates and doors. Seal joints with FSK tape. Provide additional adhesive or staples to assist tape adhesion in difficult applications.
- B. Flexible Blanket Insulation: Apply insulation with joints tightly butted. Staple laps of jacket with outward clinching staples and seal with foil scrim kraft (FSK) tape. Sagging of flexible duct insulation shall not be permitted. For ductwork over 24-inches wide on horizontal duct runs, provide pins, washers and clips. Install speed washers with pins and pin trimmed to washer. Cut off protruding ends of pins after clips are secured. Seal with FSK tape, extend tape 1" minimum around pin. Use pins on sides of vertical ductwork being insulated. Space pins and clips on 18 inch centers and not more than 18 inches from duct corners. Carry insulation over standing seams and trapeze-type hangers.

### 3.5 EQUIPMENT INSULATION

- A. General Procedures: Apply equipment insulation suitable for temperature and service to fit as closely as possible to equipment. Join sections of insulation with adhesive. Bevel insulation around name plates, ASME Stamp, and access plates. For insulation on equipment that must be opened periodically for inspection, cleaning, or repair, construct insulation to be removable and replaceable without damage. Provide vapor barrier seal at joints and seams for "cold" equipment.
- B. Heating Equipment: Provide semi-rigid mineral fiber board insulation. Seal longitudinal and lateral seams with FSK tape. Bond cuts, ends, and mitered sections with adhesive. Provide a vinyl-acrylic mastic coating on exposed fiberglass ends.
- C. Cold Equipment: Provide flexible unicellular sheet insulation, bond cuts, butt joints, longitudinal joints and ends with vapor barrier adhesive. Vapor seal exposed edges to equipment.

### 3.6 INSULATION APPLICATION SCHEDULE

<u>SERVICE</u>	<u>THICKNESS</u>	<u>MATERIAL/JACKET</u>
<u>PIPING (including PEX tubing):</u>		
Domestic Cold Water Piping		
1" and smaller	3/4"	Fiberglass w/ASJ or Flexible Unicellular
1-1/4" and larger	1"	Fiberglass w/ASJ or Flexible Unicellular
Domestic Hot Water Piping and Domestic Hot Water Recirculation Piping		
1" and smaller	1"	Fiberglass w/ASJ or Flexible Unicellular
1-1/2" and 1-1/4"	1-1/2"	Fiberglass w/ASJ or Flexible Unicellular
2" and larger	2"	Fiberglass w/ASJ or Flexible Unicellular
Water and Drain Piping Under Handicap Accessible Fixtures		Insulation Kit
HWS/R Piping 1-1/2" and smaller	1-1/2"	Fiberglass w/ASJ or Flexible Unicellular
Condensate Drain Piping	1/2"	Flexible Unicellular
Refrigerant Suction/Liquid Piping	3/4"	Flexible Unicellular (w/ PVC jacket outdoors)
Roof drain sump bodies and Roof Drain Piping	1/2"	Flexible Unicellular
<u>DUCTWORK:</u>		
ERV Supply/Return Ductwork	2.2", R6	Ductwrap, FSK
<u>EQUIPMENT:</u>		
Flexible Connectors, Valves, etc.	1/2"	Flexible Unicellular

### 3.7 FIELD INSPECTION

- A. Visually inspect to ensure that materials used conform to specifications.  
Inspect installations progressively for compliance with requirements.

### 3.8 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping & Smoke Seals". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

\* END OF SECTION \*

## SECTION 230900 - AUTOMATIC TEMPERATURE CONTROLS

### PART 1 GENERAL

#### 1.1 DESCRIPTION

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the automatic temperature control system indicated. The controls package shall be compatible with Campus wide **Trane Control system**. The system shall be a direct digital control (DDC) system with web-based access and dynamic color graphics software providing the sequences as described in these specifications. The ATC system shall be complete with required components including, low voltage and line voltage wiring and conduit. Wiring shall be in accordance with Division 16 of the specifications and NFPA 70, National Electrical Code.
- B. The automatic temperature controls system shall be provided and installed by TRANE control mechanics regularly employed in the installation and calibration of ATC equipment by one of the manufacturers' of such equipment, as listed below. Control installation by any Contractor whose principal business is not direct manufacture and installation is prohibited.

#### 1.2 ACCEPTABLE MANUFACTURERS / INSTALLERS

- A. **Trane only – No substitutions – Expanding existing Controls systems.**

#### 1.3 RELATED DOCUMENTS

- A. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" and Section 26 00 00 "Electrical" are hereby made a part of the work of this section.
- B. Coordinate with Section 01 91 00 Commissioning.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.

#### 1.4 SUBMITTALS

- A. Substitutions: NONE – TRANE ONLY NO SUBSTITUTIONS.
- B. The items for which the shop drawings paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:
  - 1. Temperature control system schematic including variables, flow diagrams, ladder diagrams, and point to point wiring diagrams, indicating set points, reset ranges, throttling ranges, controller gains, differentials, operating ranges,

normal positions, controller action, dial ranges, voltages, currents, mounting locations, indicators, and terminal strip points.

2. Sequence of operation for each system and function.
  3. Generic, functional description of each control component indicated.
  4. Equipment interlocks required by sequence of operation.
  5. Automatic valve schedule showing flow, Cv, and pressure drop.
  6. Manufacturer's Data:
    - a. Dampers, valves and operators.
    - b. Controllers, including wiring and connection diagrams.
    - c. Thermostats, temperature sensors, including wiring and connection diagrams.
    - d. Temperature and pressure indicators.
    - e. Pressure sensors, including wiring and connection diagrams.
    - f. Switches, relays, transmitters, transformers, including wiring and connection diagrams.
  7. Dynamic color graphics software data.
- C. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- D. Product Data: Submit data on product characteristics, performance criteria and limitations.
- E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

## 1.5 WARRANTY

- A. The automatic temperature control system shall have a two (2) year parts and labor warranty.

## PART 2 PRODUCTS

### 2.1 CONTROL PANELS

- A. In general, relays, transformers, or other control devices (not including room thermostats or duct-mounted instruments) shall be grouped and mounted in a factory-built cabinet enclosure.

## 2.2 AUTOMATIC CONTROL DAMPERS

- A. Automatic dampers not furnished with equipment shall be furnished under this paragraph. Automatic dampers shall be constructed and installed in accordance with the following specifications:
1. Damper Blades: All automatic dampers, including dampers for static pressure control, shall be of the balanced type, factory-fabricated, with fully gasketed galvanized steel airfoil blades, mounted in welded frames. Damper blades shall be not more than 8 inches wide, shall have interlocking edges, edge and jamb seals and be capable of operation against 4" static pressure differential. Dampers shall be Arrow "Arrow-Foil" Model PBDAF-206, OBDAF-207, Ruskin Model CD-60 or Tamco Series 1000.
  2. Modulating Dampers: All modulating dampers shall be of the opposed blade type.
  3. Damper Size and Bearings: Damper blades shall have steel trunnions mounted in oil-impregnated bearings. Dampers shall be not more than 48 inches in length between bearings.
  4. Frames: Damper frames shall be of welded channel or angle-iron, with heavy steel corner gussets and braces or stiffened with steel tie-rods where necessary. Frames shall be painted with aluminum paint to prevent rusting.
  5. Dampers shall be guaranteed to close tightly, and shall provide substantially the full area of the opening when open. All outdoor air intakes and all exhaust ducts to outside and all fresh air, return air and exhaust air dampers in systems shall have damper blades with inflatable seals or other devices to guarantee low leakage, not to exceed 4 CFM/SF at 1 in. WG pressure differential.
  6. Damper Linkages: Damper-operating links shall be cadmium plated steel or brass rods, adjustable in length with ball and socket joints and of such proportions that they will withstand, without appreciable deflection, a load equal to not less than twice the maximum operating force of the damper motor. Linkages shall be concealed in the frame.
- B. Damper Actuators: For each automatically controlled damper, a suitable damper actuator or actuators shall be provided in accordance with the following specifications:
1. Actuator: Damper actuators shall be electronic, direct-coupled, spring-return type and have a rating of not less than twice the torque needed for actual operation of the damper.
  2. Adjustments: Provide adjustable stops for the open and closed positions.
  3. Mounting: Damper actuators shall be direct-coupled over the shaft. The damper actuators and mounting base shall not be mounted directly on cold or

insulated ducts and casings, but shall be mounted outside the insulated covering in such a manner as to prevent sweating and interference with the insulation.

4. Where indicated, damper actuators shall be provided with an auxiliary switch rated at 120 V AC, and accept a 4 to 20 ma input.

## 2.5 TEMPERATURE SENSORS

- A. Room thermostats/temperature sensors shall be Trane wireless sensors capable of being tied into existing Trane infrastructure reporting to the BMS, heat only (heat/cool where applicable), 60 minute power backup, with setpoint adjustment and LCD display for temperature and setpoint status. Units shall have adjustable temperature limiting capability.
- B. No devices containing mercury are permitted.
- C. Thermostats in "public/common areas" shall have clear plastic lockable guards.

## 2.6 SEQUENCE OF CONTROL

- A. Provide and install electronic/electric DDC components to enable the mechanical system to operate in the following sequences:
  1. Energy Recovery Ventilators (ERV-#):
    - a. Fans: Exhaust air and outside air motorized dampers shall open, supply and exhaust fans shall operate continuously. Variable speed drives shall be used for balancing.
    - b. Supply Air Temperature Reset: The 3-way mixing valve serving the hydronic duct coil shall operate to maintain a discharge air temperature of 75°F at outside air temperatures below 60°F. Future: the split heat pump / refrigerant coil shall operate to maintain a discharge air temperature of 58°F at outside air temperatures above 70°F.
    - c. Freeze Protection: A manual reset freezestat shall shutdown the fans and close the outside air and exhaust air dampers if the discharge air leaving the ERV drops below 45°F.
  2. Wall Heaters (WH-#): Wall heater fans shall operate on a call from the space temperature sensor to satisfy the space temperature setpoint.
  3. Cabinet Unit Heaters (CUH-#): Cabinet unit heater fan shall operate, based on a pipe mounted aquastat, on a call from the space temperature sensor to satisfy the space temperature setpoint.
  4. Domestic water recirculation pump: Shall operate based on a pipe-mounted aquastat with the pump "on" at 110°F and "off" at 115°F.

## PART 3 EXECUTION

### 3.1 SURFACE CONDITIONS

#### A. Inspection:

1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
2. Verify that the automatic temperature control and system may be installed in strict accordance with pertinent codes and regulations and the reviewed Shop Drawings.

### 3.2 INSTALLATION

- A. Provide wiring, and conduit to connect the ATC components for an operational ATC system. Wiring and installation shall conform to NFPA 70.
- B. Identification: Label or code each field wire at each end. Permanently label or code each point of field terminal strips to show the instrument or item served. Color-coded cable with annotated cable diagrams may be used to accomplish cable identification.
- C. Temperature Sensors: Stabilize sensors to permit on-the-job installation that will require minimum field adjustment or calibration. Temperature sensor assemblies shall be readily accessible and adaptable to each type of application to allow quick, easy replacement and servicing without special tools or skills. Strap-on sensor mountings, using helical screw stainless steel clamps, shall be permitted on new piping for unit heater or other on-off operation only, after pipe is cleaned to bright metal. Strap-on bulb and pipe shall be insulated after installation. Strap-on sensor mountings are also permitted for hot water piping sizes up to 2 inches. Other liquid temperature sensors shall be provided with wells.
- D. Duct Sensors: Provide sensors in ductwork; specific location within duct shall be selected to accurately sense air properties. Do not locate sensors in dead air spaces or positions obstructed by ducts or equipment. Installation shall be within the vibration and velocity limits of the sensing element. Where an extended surface element is required to sense the average or lowest air temperature, position and securely mount sensor within duct in accordance with sensor manufacturer's recommendations. Temperature sensing elements shall be thermally isolated from brackets and supports. Provide separate duct flange for each sensing element; securely seal ducts where elements or connections penetrate duct. Seal penetrations of duct insulation vapor barrier with vapor barrier coating compound to provide a vapor-tight covering. Mount sensor enclosures to allow easy removal and servicing without disturbance or removal of duct insulation or vapor barrier. On downstream side of each sensor, provide access doors.
- E. Pipe Sensors: Provide wells for sensors measuring temperatures in pressure vessels or in pipes. Wells shall be noncorrosive to the medium being measured and

shall have sufficient physical strength to withstand the working and test pressures and velocities. Locate wells to sense continuous flow conditions. Do not install wells using extension couplings. Where piping diameters are smaller than the length of the wells, provide wells in the piping at elbows to effect proper flow across the entire area of the well. Wells may either look upstream or downstream. Provide thermal transmission material within the well to speed the response of temperature measurement. Provide wells with sealing nuts to contain the thermal transmission material and allow for easy removal. Wells shall not restrict flow area to less than 70 percent of line-size-pipe normal flow area. Increase piping size as required to avoid restriction.

### 3.3 ADJUSTMENTS

- A. Adjust controls and equipment to maintain the conditions indicated, to perform the functions indicated, and to operate in the sequence specified.

### 3.4 INSTRUCTING OPERATING PERSONNEL

- A. Upon completion of the work and when designated by the Architect, furnish the services of a competent technician regularly employed by the temperature control manufacturer for the instruction of Owner in the operation and maintenance of each automatic space temperature control system. The period of instruction shall be for not less than one 8 hour period and shall include video tape demonstration of controllers.

### 3.5 FIELD INSPECTION AND TESTS

- A. Tests shall be performed or supervised by employees of the ATC system or manufacturer of the ATC system, or by an authorized representative of the ATC manufacturer. Give Architect 14 calendar days advance written notice prior to the date of the field acceptance testing. If the Architect witnesses tests, such tests shall be subject to approval. If the Architect does not witness tests, provide performance certification.
- B. Plan for Inspections and Tests: Furnish a written inspections and tests plan at least 60 days prior to the field acceptance test date. This plan shall be developed by the manufacturer of the ATC system. The plan shall delineate the inspections and testing procedures required for the ATC system to demonstrate compliance with the requirements specified. Additionally, the test plan shall indicate how ATC system is to be tested, what variables will be monitored during test, names of individuals performing tests, and what criteria for acceptance should be used. Indicate how operation of H&V system and ATC system in each seasonal condition will be simulated.
- C. Field Acceptance Testing: Upon completion of 72 hours of continuous H&V and ATC systems operation and before final acceptance of work, test the automatic temperature control systems in service with the heating, ventilating and air conditioning systems to demonstrate compliance with contract requirements. Test controls through each cycle of operation, including simulation of each season insofar as possible. Test safety controls to demonstrate performance of required

function. Adjust or repair defective or malfunctioning automatic space temperature control equipment or replace with new equipment. Repeat tests to demonstrate compliance with contract requirements. Commissioning Agent shall be present to witness Final Acceptance Testing.

\* END OF SECTION \*

## **SECTION 233000 - DUCTWORK AND ACCESSORIES**

### **PART 1 GENERAL**

#### **1.1 RELATED DOCUMENTS**

- A. The drawings and the specifications including Section 23 05 00 "Supplemental Mechanical General Requirements" are hereby made a part of the work of this section.
- B. Coordinate with Section 01 91 00 Commissioning.
- C. Drawings and general provisions of Contract including General and Supplementary Conditions and all Division 1 specification sections.
- D. Provision of waste management: Section 01 74 19, Construction Waste Management and Disposal.

#### **1.2 DESCRIPTION OF WORK**

- A. The work covered by this Section of the specifications includes the furnishing of labor, materials, equipment, transportation, permits, inspections and incidentals and the performing of operations required to install the ductwork systems indicated.

#### **1.3 SUBMITTALS**

- A. Substitutions: Your attention is directed to Section 23 05 00-"Substitutions", relative to competition and the (ONLY) notation. Familiarity with this section should be achieved before reading the PRODUCTS section of this specification.
- B. The items for which the submittals paragraph in Section 23 05 00, Supplemental General Mechanical Requirements, apply are as follows:
  - 1. Ductwork.
  - 2. Ductwork accessories.
  - 3. Air devices.
  - 4. Firestopping materials and methods.
  - 5. Louvers and dampers.
  - 6. Ductwork sealing products.
  - 7. Fire dampers.
- C. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- D. Product Data: Submit data on product characteristics, performance criteria and limitations.
- E. Manufacturer's Installation Instructions: Submit procedure for preparation and installation.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

## PART 2 PRODUCTS

### 2.1 DUCTWORK

- A. Classification of Ductwork: Low pressure ductwork: up to 2" W.G. static pressure.
- B. Materials: Unless otherwise indicated low pressure ductwork shall be galvanized steel. Galvanized sheet metal shall be new galvanized steel sheets of lock forming quality with zinc coating that will not flake or peel under forming operation.
- C. Construction for Low Pressure Round and Rectangular Ductwork:
  - 1. Material: Galvanized steel conforming to ASTM A527, weight of galvanized coating shall be not less than 1-1/4 ounces total for both sides of one sq.ft. of a sheet. Construction, metal gage, and reinforcements shall conform with SMACNA "Duct Construction Standards" and NFPA 90A for 2" W.G. pressure class.
  - 2. Fittings: Shall be constructed in accordance with SMACNA Standards and shall be of the types indicated (ONLY).
  - 3. Longitudinal joints shall be Pittsburgh lockseam (ONLY). Button punch snap locks are not acceptable.
  - 4. Joints shall be sealed to SMACNA seal class B.

### 2.2 DUCTWORK ACCESSORIES

- A. Access Doors: Ruskin Model ADC2, 12"x12" size, 24 gauge galvanized steel, steel on both sides of door, foam gasket seals, 1" insulation, 2 cam locks, no hinge.
- B. Counter Balanced Dampers (CBD): Aluminum frame and blades, extruded vinyl edge seals, 2-1/4" deep, set 0.06" WG.
- C. Backdraft Dampers (BDD): Ruskin Model CBD2 or American Warming and Ventilating aluminum frame and blades, extruded vinyl edge seals, field set at 0.10" W.G. pressure differential for full open operation.
- D. Fire Dampers: Greenheck FD-series, Ruskin Model IBD2, or Cesco, curtain type, 100% free area (ONLY), Style C for round duct installations, and Style B for rectangular duct applications. Fire dampers located immediately behind transfer grilles may be Style A dampers. The dampers shall be UL rated for 1-1/2 hours and have a 165°F fusible link. Fire dampers shall comply with UL "Standard for Safety" 555.
- E. Flexible Duct Connections: Ventfabrics, Inc. neoprene coated glass fabric.
- G. Turning Vanes: (Low Pressure):

1. Solid blade, mounted with the long edge down stream in accordance with duct construction details indicated. Submit a 12"x12" sample elbow for review prior to fabrication.
  - H. Volume Dampers (where not required to be automatic):
    1. Factory fabricated as specified, or shop fabricated in accordance with SMACNA "HVAC Duct Construction Standards".
    2. Rectangular: Ruskin Model MD-35, or American Warming and Ventilating, 12 gauge galvanized steel, locking quadrant, opposed blade over 11", single blade 11" and under.
    3. Round: Ruskin Model MDRS25, or American Warming and Ventilating, 20 gauge galvanized steel with locking quadrant(ONLY). Dampers may be provided integral with spin-in fittings.
  - I. Flexible Ductwork: Flexible ductwork is prohibited from use on this project.
  - J. Joint Sealer:
    1. Hardcast Two-Part II DT tape with RTA-50 indoor/outdoor activator.
    2. Hardcast Duct-Seal 321 water based indoor/outdoor sealant.
  - K. Louvers (L): Ruskin Model ELF6375DX, Greenheck, or American Warming and Ventilating. Extruded aluminum construction, 0.081" thick, aluminum extrusions, drainable blade, 1/2" expanded metal bird screen, size and performance as scheduled. AMCA certified leakage rate shall be a maximum of 0.02 ounces of water per square foot of free area at 1000 FPM free area velocity. Provide Kynar 500 finish, color selected by Architect. Provide frame styles compatible with building construction, see architectural details. Provide concealed architectural or standard visible mullions in multi-panel louver assemblies as indicated on the drawings. Inactive / blanked-off louvers shall have a double wall sheetmetal closure on the interior face of the louver. The closure shall have a 2" thickness of 1.5 pcf rigid fiberglass board insulation with a foil face. Both sides of the sheetmetal shall be painted flat black.
  - L. Ceiling Radiation Dampers: Ruskin CFD series or Greenheck CRD-1LP series, UL rated for 1-1/2 hours with 165 °F fusible link. Furnish with integral volume control option and thermal blanket for acoustical tile ceilings and where required. Ceiling Radiation Dampers shall comply with UL "Standard for Safety 555."
- 2.3 AIR DEVICES (Krueger, Price, MetalAire, Titus, Seiho, Air Concepts, Fantech) ONLY
- A. Material and Finishes: Construct diffusers, registers, and grilles of aluminum. Exterior and exposed edges shall be rolled, or otherwise stiffened and rounded. Steel parts shall be factory zinc-phosphate treated prior to priming and painting or have a baked-on enamel finish. Aluminum parts shall be finish painted. Provide frame style compatible with ceiling or wall type. Colors shall be selected by Architect. Devices to

be installed on exposed duct installations shall be furnished in primer suitable for field application of color coat.

- B. Sound Pressure Level: Manufacturer certified sound pressure level rating of inlets and outlets in accordance with ADC 1062 R4. Conform with the permissible room sound pressure level for each device as scheduled.
- C. Throw: Defined as distance from the diffuser, register, or grille to the point which the resultant room air velocity is 50 to 35 feet per minute.
- D. Ceiling Diffusers: Equip with core styles required to provide air distribution pattern indicated. Internal parts shall be removable through the diffuser-neck for access to the duct and without the use of special tools. Construct each diffuser of four or more concentric elements designed to deliver air in a generally horizontal direction. The interior elements of square and rectangular ceiling diffusers may be square or rectangular as manufacturer's standard. Screws or bolts in exposed face of frames or core elements are not acceptable. Diffusers shall have an opposed blade volume damper in the diffuser neck. Diffusers shall have a 24"x24" lay-in panel for areas with acoustical ceilings and surface-mount frame for GWB ceilings. Provide Ceiling Radiation Dampers (CRD) where indicated and required.
- E. Grilles and Registers: Construction and finish as indicated, 1/2" louver spacing, 45° curved blade. Registers shall have opposed-blade volume dampers with screwdriver adjuster. Unless otherwise indicated, registers shall be provided.
- F. General: The interior of all sheetmetal connections to grilles, registers and diffusers shall be painted with a non-specular flat black paint so that no sheetmetal surfaces are visible from the finished space.
- G. Transfer Grilles: MetalAire RH Series or equal, aluminum construction.

## 2.4 DUCT LEAK TESTING

- A. Ductwork systems shall be leak-tested by the Commissioning Agent in accordance with SMACNA, Maine Housing "Green Building" Standards and as follows:
  - 1. The duct system shall be tested per Maine Housing requirements. Total maximum leakage shall not exceed 2% of total system design airflow. Leaks shall be located and sealed until the system passes the leak test.
- B. The leakage testing shall be witnessed by a representative of the Owner and the results shall be submitted to the Engineer and Maine Housing for review.

## PART 3 EXECUTION

### 3.1 SURFACE CONDITIONS

#### A. Inspection:

1. Prior to work of this Section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
2. Verify that the duct systems may be installed in accordance with pertinent codes and regulations and the reviewed Submittals.

### 3.2 INSTALLATION OF DUCTWORK AND AIR DEVICES

- A. Provide and erect in accordance with the best practice of the trade ductwork shown on the drawings and as required to complete the intended installation. Make offsets as shown or required to place ductwork in proper position to avoid conflicts with other work and to allow the application of insulation and finish painting to the satisfaction of the Architect. Sizes given are "inside - clear" dimensions and not necessarily that of sheet metal. Ducts shall be arranged to adjust to "field conditions". The Sheet Metal trades shall coordinate his work with other trades. Work shall conform to ASHRAE duct construction recommendations, SMACNA "Duct Construction Standards", NFPA, and the requirements of IBC.
- B. Joint Sealing: See PRODUCTS section.
- C. Longitudinal joints: See PRODUCTS section.
- D. Turns shall be made with long radius elbows or, if physically impossible to use long radius elbows, shall be square turns with specified turning vanes. CAUTION: Turns not conforming to this requirement shall be ordered removed and replaced with properly built turns.
- E. Access Doors: Provide access doors for concealed apparatus requiring service and inspection in the duct system including but not limited to dampers, sensors and motors, and upstream and downstream from duct coils.
- F. Duct Sleeves and Prepared Openings: Install duct sleeves and prepared openings for duct mains, duct branches, and ducts passing through walls, roofs, and ceilings. Insure the proper size and location of sleeves and prepared openings. Allow one-inch clearance between duct and sleeve or one-inch clearance between insulation and sleeve for insulated ducts, except at grilles, registers, and diffusers.
- G. Duct Supports: Unless otherwise indicated, provide one-inch wide by 16 gage galvanized steel sheet metal strips on each side of ducts. Anchor risers in the center of the vertical run to allow ends or riser free vertical movements. Attach supports only to structural framing members. Do not anchor supports to metal decking unless a means is provided (architectural review required) for preventing the anchors from puncturing the metal decking. Where supports are required between structural framing

members, provide suitable intermediate metal framing. Where C clamps are used, use retainer clips.

- H. Flexible Collars and Connections: Provide flexible collars between fans and ducts or casings and where ducts are of dissimilar metals, as indicated or required. For round ducts, securely fasten flexible connections using stainless steel clinch-type draw-band. Nylon drawbands may be used if installed using the drawband manufacturer's lever-action tightening tool. For rectangular ducts, lock flexible connections to metal collars.
- I. Flexible Ducts: Provide where indicated. No fiberglass shall be in contact with air flow. Flexible duct length shall not be more than 4'-0". Install with metal band hangers and without excess length, provide maximum extension of flex duct. Securely fasten flexible ducts to metal collars using a stainless steel or tool-tightened nylon drawband on the duct core and a second drawband on the insulation vapor barrier. If the duct exceeds 12 inches diameter, position the drawband behind a bead on the metal collar. Taping in lieu of drawbands is not allowed.
- J. Any deviation in the duct system must be submitted as a shop drawing and stamped. CAUTION: Any deviation not submitted and favorably reviewed will be ordered removed from the system and replaced with that which is shown on the Drawings.
- K. Discrepancies between actual field conditions and the Contract Documents shall be brought to the attention of the Architect prior to fabrication.
- L. Field Changes to Ductwork: Field changes of ducts such as those required to suit the sizes of factory-fabricated equipment actually furnished shall be designed to minimize expansion and contraction. Use 4:1 transitions in field changes as well as modifications to connecting ducts.
- M. Transitions with a slope greater than 4 to 1 shall be ordered removed from the system and replaced with a transition which meets this criteria.
- N. Joints and seams at intake and exhaust plenums and joints on intake and exhaust ductwork for a distance of 3 feet from the plenum shall be sealed watertight on the bottom and side joints and seams.
- O. Isolation dampers at intake and exhaust louvers and vent hoods shall be sealed to the ductwork to provide an airtight assembly with similar performance characteristics to the isolation damper.
- P. Ductwork serving clothes dryers shall not have sheetmetal screws. All joints shall be taped with VentureTape 1580P, 2.0-mil annealed aluminum foil tape coated with a heavy application of mastik adhesive, UL 181B-FX listed.

### 3.3 CLOSING IN WORK

- A. Cover up or enclose work after it has been properly and completely tested and reviewed.

- B. No additional cost to the Owner will be allowed for uncovering or recovering any work that is covered or enclosed prior to required test and review.

### 3.4 TEST AND ADJUST

- A. Before operating any system, the system shall be cleaned out to remove dust and foreign materials.
- B. After the installation is complete and ready for operation, test the system under normal operating conditions in the presence of the Architect and demonstrate that the system functions as designed.
- C. Correct defects which develop during the test period, conduct additional testing until defect free operation is achieved.

### 3.5 CLEANUP AND CORROSION PREVENTION

- A. Ductwork and equipment shall be thoroughly cleaned. Dirt, dust, and debris shall be removed and the premises left in a clean and neat condition.
- B. Before covering is applied to duct systems, clips, rods, clevises and other hanger attachments, and before uncovered piping is permitted to be concealed, corrosion and rust shall be wire brushed and cleaned and in the case of iron products, a coat of approved protective paint applied to these surfaces.

### 3.6 INSTRUCTIONS

- A. On completion of the project, instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed four (4) hours. The time of instruction shall be arranged with the Owner. In addition to the prime Mechanical Contractor, the control system Contractor, Balancing Contractor, and Owner's representative shall be present and participate in the Owner's instruction.

### 3.7 FIRESTOPPING

- A. Firestopping shall be performed in accordance with Specification Section 07 84 00 "Firestopping". All penetrations of fire-rated assemblies including walls and floors by mechanical system components (piping, ductwork, conduits, etc.) shall be firestopped as specified.

\* END OF SECTION \*

## **SECTION 260000 - GENERAL ELECTRICAL REQUIREMENTS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Basic Electrical Requirements specifically applicable to Divisions 26.

#### **1.02 REFERENCES**

- A. ANSI/NFPA 70 - National Electrical Code.
- B. ANSI C2 - National Electrical Safety Code.
- C. ANSI/NFPA 101 - Life Safety Code.

#### **1.03 RELATED REQUIREMENTS**

- A. Conditions of the Contract and Division 1 - General Requirements, apply to all work, including work of this Division. Examine all contract documents for requirements affecting this work.

#### **1.04 SUBMITTALS**

- A. Submit under provisions of Division 01.
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. Mark dimensions and values in units to match those specified.
- D. Provide fixture schedule, lighting drawings, panelboard schedules and single line or risers diagram(s) to supplier for assistance in pricing as applicable. Contractor shall receive one set of black line drawings for reproduction from the engineer for this purpose.

#### **1.05 REGULATORY REQUIREMENTS**

- A. Conform to applicable local, State and Federal Building Code for the State of Maine.
- B. Electrical: Conform to NFPA 70, NFPA72, NFPA 99, NFPA 101, ANSI C2, 2 FM, UL, and applicable ASTM and ANSI Standards.
- C. Contractor shall visit the site to become familiar with all existing conditions affecting this work. No claim shall be recognized for extra compensation due to failure of contractor to familiarize himself/herself with the conditions and extent of proposed work.

- D. Obtain permits and request inspections by local authority having jurisdiction.

#### 1.06 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Engineer before proceeding.

#### 1.07 TEMPORARY LIGHT AND POWER

- A. Temporary light and power shall be installed and maintained by the Electrical Contractor for use by all trades for the duration of construction complete with all wiring, switches, protective devices and similar equipment as may be required. Arrangement for the temporary service with the Power Company is the responsibility of the Electrical Contractor. Power bills will be paid by the General Contractor. Provide 120/208 volt or 120/240 volt 100 ampere, drop box similar to standard CMP detail 980-31.1.4. Provide 15-20 watt self-ballasted compact fluorescent, lamps with plastic "cages" as needed. or 4 foot twin lamp (T8) fluorescent tamper-proof, gasketed and water-tight as required.

#### 1.08 CONTRACT DRAWINGS AND SPECIFICATIONS

- A. It is to be understood that drawings accompanying these specifications are intended to show general arrangement and extent of work to be done, but exact location and arrangement of all components shall be determined as work progresses. Anything shown on the drawings and not specifically mentioned in specifications or vice versa shall be considered as required in both.
- B. Locations of equipment, and materials, etc., as given on drawings are approximate unless dimensioned. It shall be understood they are subject to such modifications as may be found necessary or desirable at time of installation in order to meet any structural conditions. Such changes shall be made by the contractor without extra charges.
- C. Because of small scale drawings, all required offsets, etc., as may be required to clear work of other Contractors, may not be shown. Contractor, however, shall provide all necessary offsets, etc., as required to complete the installation of their work and not conflict with that of others.
- D. It is the intention that wiring systems shall be complete and fully operational. The contractor shall identify system components during the bid process that clearly constitute conditions that would cause the system to be incomplete. Clarification: The remedy to these discrepancies shall be communicated by the engineer to all bidders or included as an addenda.

#### 1.09 MATERIALS AND LABOR

- A. Bidders for this work shall carefully examine the Plans and Specifications, as the Contractor shall be required to furnish all materials and labor necessary to deliver to the Owner a complete system installed in full accordance with Local State and Federal laws. The system shall be furnished as specified, tested, and turned over to the Owner in perfect operating condition.
- B. All materials shall be new and of best quality of their respective kinds. Workmanship in all respects shall be of highest grade and all construction shall be done according to best practices of the trade. Materials shall be warranted directly by the manufacturer.
- C. Contractor shall provide, when required for review of Engineer, labeled samples of any material or equipment specified herein or proposed to be used on this project.
- D. Where words "furnish", "provide" or "install" are mentioned, either singly or in combination, these words are hereby interpreted to mean "furnish and install" or "provide and install," including all materials complete with all connections, supplemental devices, accessories and appurtenances, unless specifically otherwise noted. These words are likewise hereby interpreted as being prefixed to all materials, equipment, and apparatus hereinafter mentioned, either in abbreviated or schedule information.

#### 1.10 PROTECTION OF WORK AND MATERIALS

- A. Contractors shall be responsible for the care and protection of all materials delivered and labor performed until the completion of the work.
- B. Cap all uncompleted lines, raceways, and ducts until ready for final connections, or future work as indicated.
- C. All portions of the work liable to damage by weather or by those engaged on the project, must be securely protected by temporary, but substantial covering which must be maintained in position until Engineer authorizes removal.

#### 1.11 REPLACEMENTS

- A. In the event of damage to any equipment or materials, immediately make all repairs and replacements necessary to the approval of the Engineer at no additional cost to the Owner.

#### 1.12 SAFETY REGULATIONS

- A. All work to be performed and/or installed shall conform to all requirements of the Occupational Safety and Health Act (OSHA) of 1970 and all Amendments thereto.

#### 1.13 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work using persons qualified to produce workmanship of specified quality.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and physical distortion or disfigurement.

#### 1.14 UNDERWRITER'S APPROVALS

- A. All electrical materials and equipment shall bear label of Underwriter's Laboratories, shall be listed by them in their list of electrical fittings and shall be approved by them for purpose for which they are to be used, unless materials and equipment are of a type for which Underwriter's Laboratories does not list or provide label service.

#### 1.15 RECORD DRAWINGS

- A. During construction, the Contractor shall keep an accurate record of all deviations to the installation of the work as indicated on the drawings. Upon completion of the work, the Contractor shall furnish a copy of this record to the Engineer, on a black line of the original which will be available from the Engineer. Submit record drawings before requesting final payment.

#### 1.16 MANUFACTURER'S REPRESENTATIVE

- A. At appropriate times, or as directed by the Engineer, provide the services of a competent factory trained Engineer or Technician of the particular manufacturer of equipment or item involved, to inspect, adjust, and place in proper operating condition any and all such items of manufacture. No additional compensation shall be allowed Contractors for such service.

#### 1.17 MANUFACTURERS' INSTRUCTIONS, AND OPERATION AND MAINTENANCE DATA

- A. Provide for each item of equipment or apparatus furnished, a complete set of printed instructions obtained from the manufacturer covering proper operation, care, lubrication, cleaning, servicing, adjustment, etc., together with any special safety instructions.
- B. Manufacturers' data shall further include performance data (time current curves,

where applicable), complete parts lists, recommended spare parts lists, and wiring diagrams.

- C. Data shall be arranged in complete sets, properly indexed and marked.
- D. Data shall include complete set of shop drawings.
- E. Material shall first be submitted in preliminary fashion for review by Engineer. After approval, Contractor shall submit two (2) copies in bound volumes to the Engineer for distribution.
- F. Provide contacts for service agencies for all major system components.

#### 1.18 GUARANTEES

- A. An item becomes "defective" when it ceases to conform to this Contract Document. Guarantees beginning on the date of issuance of the Owner's final payment, or certificate of substantial completion, with Owner taking occupancy or beneficial use thereafter.
- B. Upon completion of the work and before applying for final payment, furnish a written guarantee, stating that the work complies with the provisions of codes listed herein and the local enforcing authorities, and that it will be free from defects of material and workmanship for the required guarantee period. Guarantee shall further state that the Contractor will, at his own expense, repair and/or replace any of his material and work which may become defective during the time of guarantee, together with other work damaged as a consequence of such defects. All manufacturers written warranties shall apply to materials. Warranties other than that of the manufacturer are not acceptable.
- C. The guarantee period shall be one (1) year except when longer periods are indicated for specific equipment.
- D. All materials in Division 26 where a written warranty is published shall require the warranty to be offered by the product manufacturer.

#### 1.19 EXISTING UTILITIES AND EQUIPMENT

- A. Extreme care shall be taken to protect existing utilities and equipment above and below grade and in all other locations. Information contained on drawings is not guaranteed as to location, invert, etc. but represent the best information available as to the location of underground and concealed utilities and equipment. The Contractor shall be responsible for the replacement of all damaged or broken utilities or equipment due to their work or operations.

#### 1.20 ENERGIZING EQUIPMENT

- A. Obtain Owner's written approval before energizing any equipment.

### PART 2 PRODUCTS

Not used.

## PART 3 EXECUTION

### 3.01 CONNECTION TO EQUIPMENT

- A The Contractor shall be responsible for proper wiring and raceway connections to equipment, make sure of alignment, both initially and under operating conditions, and provide proper supports, brackets, means of expansion, etc., to make sure that no excessive stresses are applied to equipment. Raceways shall be run to the equipment and alignment checked before final bolting and fastening.
- B At the request of the Engineer, dismantle equipment connections to demonstrate proper installation and make such corrections necessary without additional compensation for disassembly, re-connection, or the required corrective work.
- C Equipment shall be installed in such a manner as to permit disconnecting for service and repairs without the necessity of rigging.

### 3.02 CLOSING IN UNINSPECTED WORK

- A General: Do not cover up or enclose work until it has been properly and completely inspected and approved. Engineer may waive this requirement by written permission.
- B Noncompliance: Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required, and after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Engineer and at no additional cost to the Owner.

### 3.03 CLEANING OF SYSTEMS

- A All wiring systems shall be thoroughly cleaned prior to initial operation and in accordance with manufacturer's instructions for equipment to be furnished and/or installed.
- B Furnish all detergents, solvents, cleaning compounds, tools, etc., required in connection with cleaning operations.
- C Thoroughly clean all exposed portions of all equipment, remove all labels, and wipe clean with a damp rag.

### 3.04 TESTING, BALANCING, AND ADJUSTING

- A Electrical loads shall be balanced on all phase legs to a tolerance of plus or minus 10 percent. Include testing circuits for shorts to ground. Measure grounding system resistance. Correct all deficiencies. Provide all test equipment.

### 3.05 INSTRUCTIONS

- A On completion of the job, Contractor shall provide competent technicians to thoroughly instruct the Owner's representative in the care and operation of the system. The total period of instruction shall not exceed 2 hours and be performed in a minimum of one interval. The time of instruction shall be arranged with the Owner. The Electrical subcontractor shall be present and participate in the Owner's instruction.

### 3.06 FIRESTOPPING

- A Firestopping shall be performed in accordance with Specification Section "Firestopping". All penetrations of fire-rated assemblies including walls and floors by electrical system components (conduits, cables, etc.) shall be firestopped as specified. Coordinate size, location and type of sleeves as required by firestopping systems.

\*\*\* END OF SECTION \*\*\*

## **SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

### **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. Building wires and cables rated 600 V and less.
  - 2. Connectors, splices, and terminations rated 600 V and less.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.

### **PART 2 - PRODUCTS**

#### **2.1 CONDUCTORS AND CABLES**

- A. Aluminum and Copper Conductors: Comply with NEMA WC 70/ICEA S-95-658.
- B. Conductor Insulation: Comply with NEMA WC 70/ICEA S-95-658 for Type THHN-2-THWN-2 and Type SO.
- C. Multiconductor Cable: Comply with NEMA WC 70/ICEA S-95-658 for nonmetallic-sheathed cable, Type NM with ground wire and metal-clad cable, Type MC and service entrance cable, type SE.

#### **2.2 CONNECTORS AND SPLICES**

- A. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

## 2.3 SYSTEM DESCRIPTION

- A. 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.
- B. Comply with NFPA 70.

## PART 3 - EXECUTION

### 3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Conductor sizes and quantities shown on drawings are for copper.
- B. Minimum branch circuit conductor size; 12 AWG
- C. Feeders: Copper for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- D. Branch Circuits (residential areas): Copper. Solid for No. 12 AWG; stranded for No. 10 AWG and larger.

### 3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-2-THWN-2, single conductors in raceway.
- B. Exposed Feeders: Type THHN-2-THWN-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-2-THWN-2, single conductors in raceway or Service Entrance Cable, type SE.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.
- E. Exposed Branch Circuits: Type THHN-2-THWN-2, single conductors in raceway.
- F. Branch Circuits (Residential spaces) Concealed in Ceilings, Walls, and Partitions: Nonmetallic-sheathed cable, Type NM.
- G. Branch Circuits (Non-Residential spaces) Concealed in Ceilings, Walls, and Partitions: metal-clad cable, Type MC.
- H. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-2-THWN-2, single conductors in raceway.

- I. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.

### 3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

### 3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material.
  1. Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

### 3.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating.

END OF SECTION 260519

## **SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

### **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: Grounding systems and equipment.
- B. Section includes grounding systems and equipment, plus the following special applications:
  - 1. Underground distribution grounding.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.

#### **1.4 QUALITY ASSURANCE**

- A. 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.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

### **PART 2 - PRODUCTS**

#### **2.1 CONDUCTORS**

- A. Insulated Conductors: Copper or tinned-copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
  - 1. Solid Conductors: ASTM B 3.
  - 2. Stranded Conductors: ASTM B 8.

3. Tinned Conductors: ASTM B 33.
  4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
  5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
  6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
  7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

## 2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

## 2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet.
1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches (1200 mm) long.
  2. Backfill Material: Electrode manufacturers recommended material.

## PART 3 - EXECUTION

### 3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

- B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2/0 AWG minimum.
  - 1. Bury at least 24 inches (600 mm) below grade.
  - 2. Duct-Bank Grounding Conductor: Bury 12 inches (300 mm) above duct bank when indicated as part of duct-bank installation.
- C. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
  - 1. Install bus on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
  - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.
- D. Conductor Terminations and Connections:
  - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
  - 2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
  - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
  - 4. Connections to Structural Steel: Welded connectors.

### 3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

- A. Comply with IEEE C2 grounding requirements.
- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- D. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

### 3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

- B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
  - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
  - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
  - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
  - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
  - 3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- D. Grounding and Bonding for Piping:
  - 1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
  - 2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
- E. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install bonding jumper to bond across flexible duct connections to achieve continuity.

### 3.4 LABELING

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems" for instruction signs. The label or its text shall be green.

### 3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
  2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed the following values:
1. Power and Lighting Equipment or System with Capacity of 500 kVA and less: 10 ohms.
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

## **SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS**

### **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. Metal conduits, tubing, and fittings.
  - 2. Nonmetal conduits, tubing, and fittings.
  - 3. Boxes, enclosures, and cabinets.

#### **1.3 DEFINITIONS**

- A. GRC: Galvanized rigid steel conduit.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

### **PART 2 - PRODUCTS**

#### **2.1 METAL CONDUITS, TUBING, AND FITTINGS**

- A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. GRC: Comply with ANSI C80.1 and UL 6.
- C. FMC: Comply with UL 1; zinc-coated steel or aluminum.
- D. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- E. Fittings for Conduit: Comply with NEMA FB 1 and UL 514B.

1. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions were installed, and including flexible external bonding jumper.
- F. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

## 2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- C. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- D. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

## 2.3 BOXES, ENCLOSURES, AND CABINETS

- A. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- B. Metal Floor Boxes:
  1. Material: sheet metal.
  2. Type: Fully adjustable.
  3. Shape: Rectangular.
  4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
- D. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).

- E. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 3R with continuous-hinge cover with flush latch unless otherwise indicated.
  - 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
  - 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

## PART 3 - EXECUTION

### 3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
  - 1. Exposed Conduit: GRC.
  - 2. Concealed Conduit, Aboveground: GRC.
  - 3. Underground Conduit: RNC, Type EPC-40-PVC.
  - 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC.
  - 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
  - 1. Exposed: RNC, Type EPC-40-PVC.
  - 2. Concealed in Ceilings and Interior Walls and Partitions: RNC, Type EPC-40-PVC.
  - 3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FNMC, except use LFNMC in damp or wet locations.
  - 4. Damp or Wet Locations: RNC, Type EPC-40-PVC.
  - 5. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 stainless steel in damp or wet locations.
- C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
  - 1. Rigid Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
  - 2. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

### 3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

- B. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
- F. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- G. Raceways Embedded in Slabs:
  - 1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
  - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
  - 3. Arrange raceways to keep a minimum of 1 inch (25 mm) of concrete cover in all directions.
  - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
- H. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- J. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- K. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- M. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

- N. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

O. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F (17 deg C) and that has straight-run length that exceeds 25 feet (7.6 m). Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F (55 deg C) and that has straight-run length that exceeds 100 feet (30 m).
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
  - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
  - b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F (86 deg C) temperature change.
  - c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F (70 deg C) temperature change.
  - d. Attics: 135 deg F (75 deg C) temperature change.
3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C) of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F (0.0115 mm per meter of length of straight run per deg C) of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

P. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LFMC in damp or wet locations subject to severe physical damage.

Q. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.

R. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

S. Locate boxes so that cover or plate will not span different building finishes.

T. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

- U. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

### 3.3 INSTALLATION OF ELECTRICAL BOXES IN FIRE RATED WALLS

- A. Outlet boxes on opposite sides of the wall shall be separated as follows:
  - 1. By a horizontal distance of not less than 24 inches (610 mm);
  - 2. By a horizontal distance of not less than the depth of the wall cavity where the wall cavity is filled with cellulose loose fill, rockwool or slag mineral wool insulation.
  - 3. By protecting both outlet boxes by listed putty pads, 3M Catalog # MPP+ or equal.
- B. Boxes exceeding 16 sq. in. (103 sq. cm) must be protected by listed putty pads, 3M Catalog # MPP+ or equal.

### 3.4 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
  - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Civil sections for pipe less than 6 inches (150 mm) in nominal diameter.
  - 2. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Civil sections"
  - 3. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
  - 4. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
    - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
    - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.

END OF SECTION 260533

## **SECTION 262416 - PANELBOARDS**

### **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. Distribution panelboards.
  - 2. Load centers.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
  - 1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
  - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
  - 3. Detail bus configuration, current, and voltage ratings.
  - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
  - 5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
  - 6. Include wiring diagrams for power, signal, and control wiring.
  - 7. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graph paper; include selectable ranges for each type of overcurrent protective device.

#### **1.4 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Keys: Two spares for each type of panelboard cabinet lock.

2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP)  
Types: Two spares for each panelboard.

## 1.5 QUALITY ASSURANCE

- A. 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.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

## 1.6 PROJECT CONDITIONS

- A. Environmental Limitations:
  1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

## 1.7 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
  1. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Enclosures: Flush- and surface-mounted cabinets.
  - 1. Rated for environmental conditions at installed location.
    - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
  - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
  - 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
  - 4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
  - 5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
  - 6. Finishes:
    - a. Panels and Trim: Steel factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
    - b. Back Boxes: Same finish as panels and trim.
  - 7. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.
- B. Phase, Neutral, and Ground Buses:
  - 1. Material: Tin-plated aluminum.
  - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
- C. Conductor Connectors: Suitable for use with conductor material and sizes.
  - 1. Material: Tin-plated aluminum.
  - 2. Main and Neutral Lugs: Mechanical type.
  - 3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
  - 4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
- D. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.
- E. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

- F. Panelboard Short-Circuit Current Rating: Fully rated or rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include size and type of allowable upstream and branch devices, and listed and labeled for series-connected short-circuit rating by an NRTL.

## 2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D; a brand of Schneider Electric.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: As scheduled
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

## 2.3 LOAD CENTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  - 3. Siemens Energy & Automation, Inc.
  - 4. Square D; a brand of Schneider Electric.
- B. Load Centers: Comply with UL 67.
- C. Branch Overcurrent Protective Devices: Plug-in circuit breakers, replaceable without disturbing adjacent units.
- D. Arc fault circuit breakers for residential branch circuits per NEC 210.12 (A)
- E. Conductor Connectors: Mechanical type for main, neutral, and ground lugs and buses.

## 2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
  2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
  3. Siemens Energy & Automation, Inc.
  4. Square D; a brand of Schneider Electric.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
  2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
  3. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replaceable electronic trip; and the following field-adjustable settings:
    - a. Instantaneous trip.
    - b. Long- and short-time pickup levels.
    - c. Long- and short-time time adjustments.
    - d. Ground-fault pickup level, time delay, and  $I^2t$  response.
  4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
  5. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
  6. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
  7. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
  8. Molded-Case Circuit-Breaker (MCCB) Features and Accessories as shown on panel schedules:
    - a. Standard frame sizes, trip ratings, and number of poles.
    - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
    - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
    - d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
    - e. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Receive, inspect, handle, and store panelboards per NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install panelboards and accessories per NEMA PB 1.1.
- B. Mount panels in non-residential spaces with top of trim 90 inches above finished floor unless otherwise indicated.
- C. Mount panels in residential spaces so no circuit breaker handle is more than 48" above finished floor.
- D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- E. Install overcurrent protective devices and controllers not already factory installed.
  - 1. Set field-adjustable, circuit-breaker trip ranges.
- F. Install filler plates in unused spaces.
- G. Stub four 1-inch (27-GRC) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-GRC) empty conduits into raised floor space or below slab not on grade.
- H. Comply with NECA 1.

### 3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Section 260553 "Identification for Electrical Systems."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

### 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Acceptance Testing Preparation:
  - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
  - 2. Test continuity of each circuit.
- C. Tests and Inspections:
  - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
  - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- D. Panelboards will be considered defective if they do not pass tests and inspections.

### 3.5 ADJUSTING

- A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as indicated.
- C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
  - 1. Measure as directed during period of normal system loading.
  - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
  - 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
  - 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

### 3.6 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature per manufacturer's written instructions.

END OF SECTION 262416

## **SECTION 262726 - WIRING DEVICES**

### **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. Receptacles, receptacles with integral GFCI, and associated device plates.
  - 2. Weather-resistant receptacles.
  - 3. Snap switches.
  - 4. Wall-switch and exterior occupancy sensors.
  - 5. Cord and plug sets.

#### **1.3 DEFINITIONS**

- A. GFCI: Ground-fault circuit interrupter.
- B. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- C. UTP: Unshielded twisted pair.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
  - 2. Cord and Plug Sets: Match equipment requirements.

#### **1.5 ACTION SUBMITTALS**

- A. Product Data: For each type of product.

#### **1.6 INFORMATIONAL SUBMITTALS**

- A. Field quality-control reports.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of wiring device and associated wall plate from single source from single manufacturer.

### 2.2 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
  - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
  - 2. Devices shall comply with the requirements in this Section.

### 2.3 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, Tamper Resistant, AFCI, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

### 2.4 GFCI RECEPTACLES

- A. General Description:
  - 1. Straight blade, Tamper Proof feed-through type.
  - 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
  - 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

### 2.5 CORD AND PLUG SETS

- A. Description:
  - 1. Match voltage and current ratings and number of conductors to requirements of equipment being connected.

2. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and ampacity of at least 130 percent of the equipment rating.
3. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

## 2.6 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Switches, 120/277 V, 20 A
- C. ADA Living Unit Kitchen Hood Light Switches:
  1. Description: NEMA WD 1, commercial, specification grade, AC only general-use dual snap switches, side wired. One switch shall control the hood light in the "high" setting, and the second switch shall control the hood "low" setting.
  2. Device Body: Plastic with toggle handle.
  3. Voltage Rating: 120-277 volts, AC.
  4. Current Rating: 20 amperes.
  5. Model Number: Pass & Seymour 6701G or equal.

## 2.7 RESIDENTIAL DEVICES

- A. Residential-Grade, Tamper-Resistant AFCI Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, and UL 498.
  1. Description: Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section.
- B. Weather-Resistant and Tamper-Resistant Convenience Receptacles, 125 V, 15 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, and UL 498.
  1. Description: Labeled to comply with NFPA 70, "Receptacles, Cord Connectors, and Attachment Plugs (Caps)" Article, "Tamper-Resistant Receptacles in Dwelling Units" Section, when installed in wet and damp locations.
- C. Telephone Outlet:
  1. Description: Single RJ-45 jack for terminating 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 6. Comply with UL 1863.
- D. Combination TV and Telephone Outlet:

1. Description: Single RJ-45 jack for 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 6. Comply with UL 1863.

## 2.8 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
  1. Plate-Securing Screws: Metal with head color to match plate finish.
  2. Material for Finished Spaces: Smooth, high-impact thermoplastic.
  3. Material for Unfinished Spaces: Galvanized steel.
  4. Material for Damp Locations: Cast aluminum with spring-loaded lift cover and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

## 2.9 FINISHES

- A. Device Color:
  1. As selected by Architect unless otherwise indicated or required by NFPA 70 or device listing.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
  1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
  2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
  3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
  4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
  1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.

2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

### 3.2 IDENTIFICATION

A. Comply with Section 260553 "Identification for Electrical Systems."

B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

### 3.3 FIELD QUALITY CONTROL

- A. Test straight-blade for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than 4 oz. (115 g).
- B. Wiring device will be considered defective if it does not pass tests and inspections.

END OF SECTION 262726

## **SECTION 265100 - INTERIOR LIGHTING**

### **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. Interior lighting fixtures, LEDs and drivers.
  - 2. Emergency lighting units.
  - 3. Exit signs.
  - 4. Lighting fixture supports.

#### **1.3 DEFINITIONS**

- A. CCT: Correlated color temperature.
- B. CRI: Color-rendering index.
- C. Lumen: Measured output of lamp and luminaire, or both.
- D. Luminaire: Complete lighting fixture.

#### **1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
  - 1. Physical description of lighting fixture including dimensions.
  - 2. Emergency lighting units including battery and charger.
  - 3. Energy-efficiency data.
  - 4. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
  - 5. Lamp data including dimensions, color temperature and power consumption
  - 6. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, and accessories identical to those indicated for the lighting fixture as applied in this Project.

- a. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.
- b. Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Installation instructions.

## 1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.

- 1. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.

## 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

- 1. Lamps: 10 of each type and rating installed. Furnish at least one of each type.
- 2. Plastic Diffusers and Lenses: One of each type and rating installed. Furnish at least one of each type.
- 3. Globes and Guards: 1 of each type and rating installed. Furnish at least one of each type.

## 1.7 QUALITY ASSURANCE

- A. 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.

- B. Comply with NFPA 70.

## 1.8 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, product(s) indicated on Drawings.

### **2.2 GENERAL REQUIREMENTS FOR LIGHTING FIXTURES AND COMPONENTS**

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
- B. Metal Parts: Free of burrs and sharp corners and edges.
- C. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
- D. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- E. Diffusers and Globes:
  - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
    - a. Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
    - b. UV stabilized.
  - 2. Glass: Annealed crystal glass unless otherwise indicated.

### **2.3 LEDs:**

- 1. The light source of the luminaires shall consist of LED arrays or bars. If required, the LED arrays or bars shall be removable.
- 2. The LEDs shall be either white or RGB, according to the light fixture schedule and Drawings. For luminaires specified with white light, it is not acceptable to provide RGB LEDs mixed to produce white light.
- 3. Refer to the light fixture schedule and Drawings for the specified correlated color temperature (CCT) of each luminaire.
- 4. Individual LEDs shall be binned by manufacturer to comply with ANSI C78.377.
- 5. The LEDs shall be manufactured by Cree, Philips, Toshiba, Osram, Samsung, or Nichia, unless otherwise noted.

## 2.4 DRIVERS:

1. The driver or power supply for the luminaire shall be modular and replaceable.
2. The rated life of the driver shall match the rated life of the LEDs and luminaire.
3. In general, the drive current rating of the driver shall be minimized, while still maintaining the required lumen output, to improve luminaire efficiency and life.
4. The driver shall meet the emission standards of IEC EN-61000-6-3 at a minimum. For healthcare or other applications with EMI sensitive equipment, provide drivers that meet more stringent standards as required.

## 2.5 EXIT SIGNS

- A. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
  1. Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
  2. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
    - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
    - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
    - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
    - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
    - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

## 2.6 EMERGENCY LIGHTING UNITS

- A. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.
  1. Battery: Sealed, maintenance-free, lead-acid type.
  2. Charger: Fully automatic, solid-state type with sealed transfer relay.
  3. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
  4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
  5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

#### **A. Lighting fixtures:**

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
2. Install lamps in each luminaire.

#### **B. Temporary Lighting:** If it is necessary, and approved by Architect, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.

#### **C. Suspended Lighting Fixture Support:**

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

#### **D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."**

### **3.2 IDENTIFICATION**

#### **A. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."**

### **3.3 FIELD QUALITY CONTROL**

#### **A. Test for Emergency Lighting:** Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

### **3.4 ADJUSTING**

#### **A. Occupancy Adjustments:** When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.

1. Adjust aimable luminaires in the presence of Architect.

END OF SECTION 265100

## **SECTION 271500 - COMMUNICATIONS HORIZONTAL CABLING**

### **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. UTP cabling.
  - 2. Coaxial cable.
  - 3. Cable connecting hardware, patch panels, and cross-connects.
  - 4. Telecommunications outlet/connectors.
  - 5. Apartment Media Center.
  - 6. Telephone Entry System

#### **1.3 DEFINITIONS**

- A. BICSI: Building Industry Consulting Service International.
- B. EMI: Electromagnetic interference.
- C. RCDD: Registered Communications Distribution Designer.
- D. UTP: Unshielded twisted pair.

#### **1.4 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate telecommunications outlet/connector locations with location of power receptacles.

#### **1.5 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. For coaxial cable, include the following installation data for each type used:
    - a. Nominal OD.

- b. Minimum bending radius.
- c. Maximum pulling tension.

## 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Connecting Blocks: One of each type.
  - 2. Device Plates: One of each type.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1 when tested according to test procedures of this standard.
- 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.
- C. Grounding: Comply with J-STD-607-A.

### 2.2 UTP CABLE

- A. Description: 100-ohm, four-pair UTP, formed into 25-pair, binder groups covered with a blue thermoplastic jacket.
  - 1. Comply with ICEA S-90-661 for mechanical properties.
  - 2. Comply with TIA/EIA-568-B.1 for performance specifications.
  - 3. Comply with TIA/EIA-568-B.2, Category 5e.
  - 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
    - a. Communications, General Purpose: Type CM or CMG.
    - b. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
    - c. Communications, Riser Rated: Type CMR, complying with UL 1666.
    - d. Communications, Limited Purpose: Type CMX.
    - e. Multipurpose: Type MP or MPG.
    - f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
    - g. Multipurpose, Riser Rated: Type MPR, complying with UL 1666.

## 2.3 UTP CABLE HARDWARE

- A. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
- B. Connecting Blocks: 110-style IDC for Category 5e. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.
- C. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.

## 2.4 COAXIAL CABLE

- A. Cable Characteristics: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.
- B. RG-6/U: NFPA 70, Type CATV or CM.
  - 1. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
  - 2. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
  - 3. Jacketed with black PVC or PE.
  - 4. Suitable for indoor installations.

## 2.5 COAXIAL CABLE HARDWARE

- A. Coaxial-Cable Connectors: F Type.

## 2.6 TELECOMMUNICATIONS OUTLET/CONNECTORS

- A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.
  - 1. Plastic Faceplate: High-impact plastic. Coordinate color with Section 262726 "Wiring Devices."
  - 2. For use with snap-in jacks accommodating any combination of UTP and coaxial work area cords.
  - 3. Legend: Snap-in, clear-label covers and machine-printed paper inserts.

## 2.7 APARTMENT MEDIA CENTER

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Leviton 47604-F6S or comparable product.

## 2.8 TELEPHONE ENTRY SYSTEM

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Linear Model AE-100 or comparable product.:

## 2.9 GROUNDING

- A. Comply with requirements in Section 260526 "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
- B. Comply with J-STD-607-A.

# PART 3 - EXECUTION

## 3.1 WIRING METHODS

- A. Install cables in pathways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal pathways and cables except in unfinished spaces.
  - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
- B. Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures:
  - 1. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
  - 2. Install lacing bars and distribution spools.
  - 3. Install conductors parallel with or at right angles to sides and back of enclosure.

## 3.2 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
  - 1. Comply with TIA/EIA-568-B.1.
  - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."

3. Install 110-style IDC termination hardware unless otherwise indicated.
4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA-569-B for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
  - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

- a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
  - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (76 mm).
  - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

### 3.3 FIRESTOPPING

- A. Comply with TIA-569-B, Annex A, "Firestopping."
- B. Comply with BICSI TDMM, "Firestopping Systems" Article.

END OF SECTION 271500

## SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Manual fire-alarm boxes.
  - 2. System smoke detectors.
  - 3. Nonsystem smoke detectors.
  - 4. Nonsystem CO detectors
  - 5. Nonsystem Strobe lights for hearing impaired
  - 6. Heat detectors.
  - 7. Notification appliances.
  - 8. Magnetic door holders.
  - 9. Addressable interface device.

#### 1.2 SYSTEM DESCRIPTION

- A. Noncoded, addressable system, with multiplexed signal transmission, dedicated to fire-alarm service only. **Expand existing Gamewell Fire alarm system to include new devices indicated on drawings. CONTACT Tim Biron @ RB Allen for all equipment, programming required for the installation.**

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
  - 2. Include voltage drop calculations for notification appliance circuits.
  - 3. Include battery-size calculations.
  - 4. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
  - 5. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.

C. General Submittal Requirements:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:
  - a. Trained and certified by manufacturer in fire-alarm system design.
  - b. NICET-certified fire-alarm technician, Level III minimum.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.
- B. Software and Firmware Operational Documentation:
  1. Software operating and upgrade manuals.
  2. Program Software Backup: On magnetic media or compact disk, complete with data files.
  3. Device address list.
  4. Printout of software application and graphic screens.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
- B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level II technician.
- C. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.
- D. 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.

## 1.7 SOFTWARE SERVICE AGREEMENT

- A. Comply with UL 864.
- B. Technical Support: Beginning with Substantial Completion, provide software support for two years.
- C. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
  - 1. Provide 30 days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

## PART 2 - PRODUCTS

### 2.1 MANUAL FIRE-ALARM BOXES

- A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
  - 1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
  - 2. Station Reset: Key- or wrench-operated switch.

### 2.2 SYSTEM SMOKE DETECTORS

- A. General Requirements for System Smoke Detectors:
  - 1. Comply with UL 268; operating at 24-V dc, nominal.
  - 2. Detectors shall be four-wire type.
  - 3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
  - 4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
  - 5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
  - 6. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status.
- B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
  - a. Primary status.
  - b. Device type.
  - c. Present average value.
  - d. Present sensitivity selected.
  - e. Sensor range (normal, dirty, etc.).

C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
  - a. Primary status.
  - b. Device type.
  - c. Present average value.
  - d. Present sensitivity selected.
  - e. Sensor range (normal, dirty, etc.).
3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

## 2.3 NONSYSTEM SMOKE DETECTORS

- A. The smoke alarm shall be Kidde model P12040 or approved equal. It shall be powered by a 120VAC, 60Hz, 80mA source along with a 9V battery back up. The unit shall incorporate a photoelectric sensor with nominal sensitivity of 1.20%/ft to 3.36%/ft. The temperature operation range shall be between 40°F and 100°F (4°C and 38°C) and the humidity operation range shall be 5% - 95% relative humidity.
- B. The smoke alarm can be installed on any standard single gang electrical box, up to a 4" octagon junction box. The electrical connection (to the alarm) shall be made with a plug-in connector. A maximum of 24 Kidde devices can be interconnected in a multiple station arrangement. The interconnect system must not exceed the NFPA (National Fire Protection Association) limit of 18 initiating devices, of which 12 can be smoke alarms. With 18 initiation devices (smoke, heat, CO, etc.), interconnected, it is still possible to interconnect 6 strobe lights and or relay modules. The unit shall provide optional tamper resistance that deters removal of the unit from the wall or ceiling.

- C. The alarm shall include a test button that will electronically simulate the presence of smoke and cause the unit to go into alarm. This sequence tests the unit's electronics, battery and horn to ensure proper operation.
- D. The unit shall include a piezoelectric horn that is rated at 85dB at 10 feet. The unit shall also include a low battery warning utilizing a brief alarm chirp every 30-40 seconds for a minimum of seven (7) days.
- E. The unit shall incorporate one red LED to indicate the alarm's current status and mode of operation. The red LED will indicate one of two conditions:
  - 1. Standby Condition: The red LED will flash every 30-40 seconds to indicate that the smoke alarm is operating properly.
  - 2. Alarm Condition: When the alarm senses products of combustion and goes into alarm, the red LED will flash rapidly (one flash per second). The rapid flashing LED and pulsating alarm will continue until the air is cleared.
- F. The unit shall incorporate one green LED to indicate the presence of AC power. The unit shall at a minimum meet the requirements of UL217, NFPA72.

## 2.4 NONSYSTEM CO DETECTORS

- A. The carbon monoxide alarm shall be Kidde Unit Number KN-COB-IC or approved equal. It shall be powered by 120VAC, 60Hz source with a 9V battery backup. The temperature operating range shall be between 40°F and 100°F (4°C and 38°C) and the humidity operating range shall be 5% - 95% relative humidity.
- B. The unit's CO sensor shall be of a fuel cell design and shall meet the sensitivity requirements of Underwriters Laboratories UL2034 Single and Multiple Station Carbon Monoxide Alarms. The alarm can be installed on the surface of any wall or ceiling following the UL/NFPA/Manufacturer's recommended placement guidelines.
- C. The alarm can be installed on any standard single gang electrical box, up to a 4" octagon junction box. The electrical connection (to the alarm) shall be made with a plug-in connector. The unit shall provide optional tamper resistance that deters removal of the unit from the wall or ceiling. No additional pieces shall be required to activate this feature.
- D. A maximum of 24 Kidde devices can be interconnected in a multiple station arrangement. The interconnect system must not exceed the NFPA (National Fire Protection Association) limit of 18 initiating devices, of which 12 can be smoke alarms. With 18 initiating devices (smoke, heat, CO, etc), interconnected, it is still possible to interconnect 6 strobe lights and or relay modules.
- E. The alarm shall include a test button that will electronically simulate the presence of CO and cause the unit to alarm. This sequence tests the unit's electronics and horn to ensure proper operation.

- F. In accordance with UL 2034 with requirements, the CO sensor will not alarm to levels of CO below 30 ppm and will alarm in the following time range when exposed to the corresponding levels of CO.
  - 1. 70 ppm CO Concentration 60 – 240 minutes
  - 2. 150 ppm CO Concentration 10 – 50 minutes
  - 3. 400 ppm CO Concentration 4 – 15 minutes
- G. The alarm shall utilize a piezoelectric horn that is rated at 85 decibels at 10 feet. When the unit detects carbon monoxide, the alarm pattern will be four (4) short beeps - followed by five (5) seconds of silence - followed by four (4) short beeps. The unit shall incorporate "Intelligent Interconnect" feature that allows it to respond to a smoke incident when interconnected with smoke alarms. During a smoke incident, the horn will sound in the required, repetitive manner for a smoke alarm – three (3) beeps, a pause, three (3) beeps, a pause.
- H. The unit shall incorporate 3 LED's. A green LED will be steady on when AC power is present and will flash every 7 seconds when in the battery only mode. A red LED will flash in unison with the sounder pattern for both a smoke or CO incident, it will flash once per 30 seconds if the alarm needs service or be steady on if the alarm is in error mode. The amber LED will illuminate if that unit is the originating alarm in a CO incident.
- I. The unit shall also indicate a low battery warning by issuing a brief alarm chirp and the red LED will flash approximately every 15 seconds

## 2.5 NONSYSTEM STROBE LIGHTS FOR HEARING IMPAIRED

- A. The LED strobe light shall be Kidde Unit SLED177 or approved equal. It shall be powered by a 120VAC, 60Hz source. The temperature operation range shall be between 32°F and 120°F (0°C and 49°C). The LED strobe light can be installed on any standard single gang electrical box, up to a 4" octagon junction box. The electrical connection (to the device) shall be made with a plug-in connector. A maximum of 24 Kidde devices can be interconnected in a multiple station arrangement. The interconnect system must not exceed the NFPA (National Fire Protection Association) limit of 18 initiating devices (Smoke, heat, CO, etc) interconnected. With 18 initiating devices, it is still possible to interconnect 6 strobe lights and/or relay modules.
- B. The unit can be directly interconnected with Kidde Safety 3-wire Smoke, Heat and CO alarms. It will produce an intermittent strobe flash pattern (approximately 4 flashes, followed by approximately 5 seconds off) when triggered by a Carbon Monoxide alarm, and a flash every second when triggered by a smoke or heat alarm. The unit shall at a minimum meet the requirements of UL1971, NFPA72, NFPA101 and Americans with Disabilities Act (ADA). The unit shall be UL Listed.

## 2.6 HEAT DETECTORS

- A. General Requirements for Heat Detectors: Comply with UL 521.

- B. Heat Detector, Combination Type: Actuated by either a fixed temperature of 135 deg F (57 deg C) or a rate of rise that exceeds 15 deg F (8 deg C) per minute unless otherwise indicated.
  - 1. Mounting: Twist-lock base interchangeable with smoke-detector bases.
  - 2. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

## 2.7 NOTIFICATION APPLIANCES

- A. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.
  - 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.
- B. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.
- C. Mini-horns in sleeping rooms: UL Listed low frequency mini horns shall be furnished and installed where indicated on plans and drawings in accordance with NFPA 72 and all applicable local codes and standards and as required by the local AHJ. The device shall be designed for indoor use in fire protective signaling systems for commercial or residential use for compliance to NFPA 13, 13D, 13R and NFPA 72. The units shall have two audibility options and an option to switch between a temporal three pattern, temporal four patten, non-temporal coded pattern, and a non-temporal (continuous) pattern. These options are set by a multiple position switch. The 520 Hz sounder shall operate on a coded or non-coded power supply. The 520 Hz sounder shall mount to a standard 4 × 4 × 1½ -inch back box, 4-inch octagon back box, double gang back box, or a single-gang 2 × 4 × 17/8-inch back box. The notification appliance circuit wiring shall terminate at the mounting plate.
- D. Mini-horns: UL Listed mini horns shall be furnished and installed where indicated on plans and drawings in accordance with NFPA 72 and all applicable local codes and standards and as required by the local AHJ. The device shall be designed for indoor use in fire protective signaling systems for commercial or residential use for compliance to NFPA 13, 13D, 13R and NFPA 72. The MT Mini Horn shall have the ability to operate in either a continuous horn mode or a temporal 3 horn mode. The horn shall be a Piezo Sounder type device and produce a high sound output of 87 dB for Continuous horn mode and 84 dB for Temporal 3 horn mode when measured in accordance with UL 464. Sound levels shall be 90 dB for Continuous horn mode and 91 dB for Temporal 3 horn mode when measured in accordance with ULC standards. The device shall have a low current draw of 72 mA/120 VAC. The device shall mount in a single gang electric box and suitable for mounting on the ceiling or wall.

- E. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output:

- a. General devices 15/30/75/110 cd, selectable in the field.
- b. Sleeping area devices 135/150/177/185 cd, selectable in the field

- 2. Mounting: Wall mounted unless otherwise indicated.
- 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
- 4. Flashing shall be in a temporal pattern, synchronized with other units.
- 5. Strobe Leads: Factory connected to screw terminals.
- 6. Mounting Faceplate: Factory finished, red.

## 2.8 MAGNETIC DOOR HOLDERS

- A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

- 1. Electromagnet: Requires no more than 3 W to develop 25-lbf (111-N) holding force.
- 2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
- 3. Rating: 24-V ac or dc.

- B. Material and Finish: Match door hardware.

## 2.9 ADDRESSABLE INTERFACE DEVICE

- A. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.

- B. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall or operate Fire/Smoke damper.

## PART 3 - EXECUTION

### 3.1 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72 for installation of fire-alarm equipment.
- B. Install wall-mounted equipment, with tops of cabinets not more than 72 inches (1830 mm) above the finished floor.

- C. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.
- D. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.
- E. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
- F. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
- G. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
- H. Device Location-Indicating Lights: Locate in public space near the device they monitor.

### 3.2 CONNECTIONS

- A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section "Door Hardware." Connect hardware and devices to fire-alarm system.
  - 1. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
- B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 3 feet (1 m) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
  - 1. Alarm-initiating connection to elevator recall system and components.
  - 2. Supervisory connections at valve supervisory switches.
  - 3. Supervisory connections at elevator shunt trip breaker.

### 3.3 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Install framed instructions in a location visible from fire-alarm control unit.

### 3.4 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

### 3.5 FIELD QUALITY CONTROL

- A. Tests and Inspections:

- 1. Visual Inspection: Conduct visual inspection prior to testing.
  - a. Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
  - b. Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
- 2. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
- 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
- 4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
- 5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
- 6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.

- B. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- C. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
- F. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

END OF SECTION 283111

## **SECTION 311000 - SITE CLEARING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping, or sealing site utilities.
7. Temporary erosion and sedimentation control.

#### **1.2 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference:** Conduct conference at the Project site.

#### **1.3 MATERIAL OWNERSHIP**

- A.** Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

#### **1.4 FIELD CONDITIONS**

- A. Traffic:** Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
  2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.
- B. Salvageable Improvements:** Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.
- C. Utility Locator Service:** Notify utility locator service for area where Project is located before site clearing.
- D.** Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

- E. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
  - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- C. Protect existing site improvements to remain from damage during construction.
  - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

### 3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

### 3.3 EXISTING UTILITIES

- A. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
  - 1. Arrange with utility companies to shut off indicated utilities.
- B. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
  - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
  - 2. Do not proceed with utility interruptions without Architect's written permission.
- C. Removal of underground utilities is included in earthwork sections; in applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security, and utilities sections; and in Section 024116 "Structure Demolition" and Section 024119 "Selective Demolition."

### 3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
  - 1. Grind down stumps and remove roots larger than 3 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
  - 2. Use only hand methods or air spade for grubbing within protection zones.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
  - 1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

### 3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth of 6 inches in a manner to prevent intermingling with underlying subsoil or other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

### 3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

### 3.7 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

## **SECTION 312000 - EARTH MOVING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses.
3. Excavating and backfilling for buildings and structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete walks and pavements.
6. Subbase course and base course for asphalt paving.
7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

#### **1.2 DEFINITIONS**

**A. Backfill:** Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

**B. Base Course:** Aggregate layer placed between the subbase course and hot-mix asphalt paving.

**C. Bedding Course:** Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

**D. Borrow Soil:** Satisfactory soil imported from off-site for use as fill or backfill.

**E. Drainage Course:** Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

**F. Excavation:** Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, will be without additional compensation.

- G. Fill: Soil materials used to raise existing grades.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other fabricated stationary features constructed above or below the ground surface.
- I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
- J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
- K. Utilities: On-site underground pipes, conduits, ducts, and cables as well as underground services within buildings.

### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct pre-excavation conference at the Project site.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Material test reports.

### 1.5 FIELD CONDITIONS

- A. Utility Locator Service: Notify Dig Safe for area where Project is located before beginning earth-moving operations.
- B. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

## PART 2 - PRODUCTS

### 2.1 SOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

- B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D2487, or a combination of these groups.
  - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
- H. Drainage Course: Narrowly graded mixture of washed crushed stone or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

## 2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth-moving operations.
- B. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

### 3.2 EXCAVATION, GENERAL

- A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
  - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

### 3.3 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
  - 1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
- B. Excavations at Edges of Tree- and Plant-Protection Zones:
  - 1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
  - 2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

### 3.4 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

### 3.5 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
  - 1. Clearance: 12 inches each side of pipe or conduit as indicated.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
  - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trenches in Tree- and Plant-Protection Zones:
  - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
  - 2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
  - 3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

### 3.6 SUBGRADE INSPECTION

- A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

### 3.7 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.
  - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

### 3.8 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
  - 1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

### 3.9 BACKFILL

- A. Place and compact backfill in excavations promptly, but not before completing the following:
  - 1. Construction below finish grade.
  - 2. Surveying locations of underground utilities for Record Documents.
  - 3. Testing and inspecting underground utilities.
  - 4. Removing concrete formwork.
  - 5. Removing trash and debris.
  - 6. Removing temporary shoring, bracing, and sheeting.
  - 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
- B. Place backfill on subgrades free of mud, frost, snow, or ice.

### 3.10 UTILITY TRENCH BACKFILL

- A. Place backfill on subgrades free of mud, frost, snow, or ice.
- B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
- C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."

- D. Initial Backfill: Place and compact initial backfill of subbase material free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
  - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- E. Final Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
- F. Warning Tape: Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

### 3.11 SOIL FILL

- A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
- B. Place and compact fill material in layers to required elevations as follows:
  - 1. Under grass and planted areas, use satisfactory soil material.
  - 2. Under walks and pavements, use satisfactory soil material.
  - 3. Under steps and ramps, use engineered fill.
  - 4. Under building slabs, use engineered fill.
  - 5. Under footings and foundations, use engineered fill.

### 3.12 SOIL MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
  - 1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
  - 2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

### 3.13 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill soil materials evenly on all sides of structures to required elevations and uniformly along the full length of each structure.

- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D1557:
  - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
  - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
  - 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.
  - 4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

### 3.14 GRADING

- A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
  - 1. Turf or Unpaved Areas: Plus or minus 1 inch.
  - 2. Walks: Plus or minus 1 inch.
  - 3. Pavements: Plus or minus 1/2 inch.
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

### 3.15 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase course and base course under pavements and walks as
  - 1. Shape subbase course and base course to required crown elevations and cross-slope grades.
  - 2. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  - 3. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D1557.

### 3.16 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- A. Place drainage course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
  - 1. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
  - 2. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D698.

### 3.17 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform inspections:
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.
- D. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.
- E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

### 3.18 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

### 3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

## **SECTION 312319 - DEWATERING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section includes construction dewatering.

#### **1.2 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at the Project site.

#### **1.3 FIELD CONDITIONS**

- A. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

### **PART 2 - PRODUCTS**

#### **2.1 PERFORMANCE REQUIREMENTS**

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. Provide temporary grading to facilitate dewatering and control of surface water.
- B. Protect and maintain temporary erosion and sedimentation controls, which are specified in Section 015000 "Temporary Facilities and Controls," Section 311000 "Site Clearing," during dewatering operations.

### 3.2 INSTALLATION

- A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
  - 1. Space well points or wells at intervals required to provide sufficient dewatering.
  - 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- B. Place dewatering system into operation to lower water to specified levels before excavating below ground-water level.
- C. Provide standby equipment on-site, installed, and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails.

### 3.3 OPERATION

- A. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
- B. Operate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
  - 1. Do not permit open sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
  - 2. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
  - 3. Maintain piezometric water level a minimum of 24 inches below bottom of excavation.
- C. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

### 3.4 FIELD QUALITY CONTROL

- A. Survey-Work Benchmarks: Resurvey benchmarks regularly during dewatering and maintain an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Architect if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

END OF SECTION 312319

## **SECTION 321216 - ASPHALT PAVING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Cold milling of existing asphalt pavement.
2. Hot-mix asphalt patching.
3. Hot-mix asphalt paving.
4. Hot-mix asphalt overlay.
5. Asphalt curbs.

**B. Related Requirements:**

1. Section 31 20 00 "Earth Moving" for subgrade preparation, fill material, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
2. Section 32 13 73 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.

#### **1.2 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference:** Conduct conference at the Project Site.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data:** For each type of product.

**B. LEED Submittals:**

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Material Certificates:** For each paving material.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.
- B. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Maine DOT for asphalt paving work.
  - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

## PART 2 - PRODUCTS

### 2.1 AGGREGATES

- A. Coarse Aggregate: ASTM D 692/D 692M, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
- B. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
- C. Mineral Filler: ASTM D 242/D 242M, rock or slag dust, hydraulic cement, or other inert material.

### 2.2 ASPHALT MATERIALS

- A. Asphalt Binder: AASHTO M 320, PG 64-28.
- B. Tack Coat: ASTM D 977 emulsified asphalt, or ASTM D 2397 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

### 2.3 AUXILIARY MATERIALS

- A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement; reclaimed, unbound-aggregate base material; and recycled tires, asphalt shingles, or glass from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.
- B. Herbicide: Commercial chemical for weed control, registered by the EPA, and not classified as "restricted use" for locations and conditions of application. Provide in granular, liquid, or wettable powder form.

## 2.4 MIXES

- A. Recycled Content of Hot-Mix Asphalt: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 10 percent or more than 15 percent by weight.
  - 1. Surface Course Limit: Recycled content no more than 10 percent by weight.
- B. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes; designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
  - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
  - 2. Base Course: MDOT Grading "B" Binder Mix.
  - 3. Surface Course: MDOT Grading "C" Surface Mix.

## PART 3 - EXECUTION

### 3.1 COLD MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
  - 1. Mill to a depth of 2 inches.
  - 2. Patch surface depressions deeper than 1 inch after milling, before wearing course is laid.

### 3.2 PATCHING

- A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseat concrete pieces firmly.
  - 1. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.

- C. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd.
  - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- D. Placing Patch Material: Fill excavated pavement areas with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

### 3.3 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- C. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
- D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
  - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
  - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

### 3.4 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
  - 1. Spread mix at a minimum temperature of 250 deg F.
  - 2. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.

- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

### 3.5 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
  - 1. Clean contact surfaces and apply tack coat to joints.
  - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
  - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
  - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

### 3.6 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
  - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
  - 1. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent or greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

- G. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

### 3.7 ASPHALT CURBS

- A. Construct hot-mix asphalt curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust. Spread mix at a minimum temperature of 250 deg F.
  - 1. Asphalt Mix: Same as pavement surface-course mix.
- B. Place hot-mix asphalt to curb cross section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.

### 3.8 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
  - 1. Base Course: Plus or minus 1/2 inch.
  - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
  - 1. Base Course: 1/4 inch.
  - 2. Surface Course: 1/8 inch.
  - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

### 3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Replace and compact hot-mix asphalt where core tests were taken.
- C. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

### 3.10 WASTE HANDLING

- A. General: Handle asphalt-paving waste according to approved waste management plan required in Section 01 74 19 "Construction Waste Management and Disposal."

END OF SECTION 321216

## **SECTION 329200 – TURF | GRASSES**

### **PART 1 - GENERAL**

#### **1.1 RELATED DOCUMENTS**

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

#### **1.2 SUMMARY**

- A. Section Includes:

- 1. Seeding.
- 2. Sodding.

- B. DESCRIPTION OF WORK

- 1. Provide all materials and equipment, and do all work required to complete the loaming, seeding and sodding including furnishings and placing topsoil, as indicated on the Drawings and as specified.

- C. RELATED WORK

- 1. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

- a. Section 312000 – EARTH MOVING.

#### **1.3 DEFINITIONS**

- A. Compaction: A loss of soil aggregates; destroyed aeration pore spaces; crushed or collapsed pore spaces; and, undergone extensive resorting and packing of soil particles.
- B. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- C. Finish Grade: Elevation of finished surface of planting soil.
- D. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

- E. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- F. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- G. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- H. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
- I. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.
- J. Surface Soil: Whatever soil is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.
- K. Turfgrass: A contiguous community of grass plants that have the ability to withstand mowing and reasonable foot traffic.

#### 1.4 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

- 1. American Society for Testing and Materials (ASTM)

- C 136 Sieve Analysis of Fine and Coarse Aggregates

- E 11 Wire-Cloth Sieves for Testing Purposes

#### 1.5 SUBMITTALS

- A. Samples: The following samples shall be submitted:

<u>Material</u>	<u>Quantity (lb.)</u>
Topsoil	1
Composted Soil Admixture	1
Fertilizer	1

- B. Manufacturer's Product Data: Manufacturer's product data shall be submitted for the following materials if to be used on the project:
- Aluminum sulfate
  - Fertilizer
  - Lime
- C. Certificates: Labels from the manufacturer's container certifying that the product meets the specified requirements shall be submitted for the following materials:
- Grass seed mix (each)      Commercial fertilizer
  - Ground limestone      Seed mix for sod
- D. Gradation and laboratory analysis: Gradation of granular materials shall be determined in accordance with ASTM C 136. Sieves for determining material gradation shall be as described in ASTM E 11. Test results that meet the specified requirements shall be submitted for the following materials:
- Topsoil without Admixture
  - Topsoil with Admixtures

## 1.6 QUALITY ASSURANCE

- A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project Site when work is in progress.

1. Pesticide Applicator: State licensed, commercial.

- B. Soil Analysis:

1. Unless otherwise provided, the Contractor shall engage an independent testing agency, experienced in the testing of agricultural soils and acceptable to the Landscape Architect, to perform the following tests and analyses:

<u>Material</u>	<u>Tests and Analysis Required</u>
Soils	Mechanical analysis of soil indicating the percent passing by weight of the following sieve sizes: 1 in., 1/2 in., No. 4, No. 10, No. 100, and No. 200. Determination of pH, organic content, and nutrient content. Recommendations shall be made by the testing agency as to the type and quantity of soil additives required to bring pH, organic content, and nutrient content to satisfactory levels for planting and grassing.

Organic Amendments Determination of moisture absorption capacity, organic matter content, and pH.

2. Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.

3. Gradation of granular materials shall be determined in accordance with ASTM C 136. Sieves for determining material gradation shall be as described in ASTM E 11.

C. Turfgrass:

1. The Contractor shall provide quality, genus, species, and variety of turfgrass indicated.
2. No changes or substitutions may be made without prior approval by the Landscape Architect, and municipal authority, if applicable.

D. Owner's Inspection And Testing

Work may be subject to inspection at any time by the Landscape Architect. The Owner reserves the right to engage an independent testing laboratory in accordance with requirements of Section 140000 – QUALITY CONTROL to analyze and test materials used in the construction of the work. Where directed by the Landscape Architect, the testing laboratory will make material analyses and will report to the Landscape Architect whether materials conform to the requirements of this specification.

1. Cost of tests and material analyses made by the testing laboratory will be borne by the Owner when they indicate compliance with the specification, and by the Contractor when they indicate non-compliance.
2. Testing equipment will be provided by and tests performed by the testing laboratory. Upon request by the Landscape Architect or Owner, the Contractor shall provide such auxiliary personnel and services needed to accomplish the testing work and to repair damage caused thereto by the permanent work.

E. Contractor's Inspection And Testing

1. Testing, analyses, and inspection required by the Contractor for his own information or guidance shall be at his own expense.
2. Materials shall not be used in construction until test results have been reviewed by the Landscape Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials:

1. Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

2. Deliver fertilizer in sealed waterproof bags, printed with manufacturer's name, weight, and guaranteed analysis.
- B. Sod: Turfgrass sod is a living, perishable product. Generally, all sod should be unrolled within 24 to 30 hours from time of harvest. During periods of 85 F degree (29 C) or higher, additional efforts must be made to reduce the amount of time between harvest and unrolling. Protect sod from breakage and drying.
1. Harvesting Sod:
    - a. Sod shall not be harvested at the nursery or approved source until ready to transport sod to the site of the work or acceptable storage location.
    - b. Before harvesting, sod shall be mowed at a uniform height of 2 in. (50 mm) or as required.
    - c. Cut sod to consistent width and length as specified.
  2. Transportation of Sod:
    - a. Sod transported to the Project in open vehicles shall be covered with tarpaulins or other suitable covers securely fastened to the body of the vehicle to prevent injury. Closed vehicles shall be adequately ventilated to prevent overheating of the sod.
    - b. Evidence of inadequate protection following the digging, carelessness while in transit, or improper handling or storage, shall be cause for rejection.
    - c. Sod shall be kept moist, fresh, and protected at all times. Such protection shall encompass the entire period during which the sod is in transit, being handled, or is in temporary storage.
    - d. Upon arrival at the temporary storage location or the site of the work, sod material shall be inspected for proper shipping procedures. Should the grass reach the permanent wilt point, the Landscape Architect will reject the sod. When sod has been rejected, the Contractor shall at once remove it from the area of the work and replace it with acceptable material.
    - e. Unless otherwise authorized by the Landscape Architect, the Contractor shall notify the Landscape Architect at least two working days in advance of the anticipated delivery date of sod material. Certificate of Inspection when required shall accompany each shipment.
  3. Handling and Storage of Sod:
    - a. Sod material shall be handled with extreme care to avoid breaking or tearing strips.

- b. Sod shall not be stored for longer than 24 hours prior to installation unless approved by the Landscape Architect. Sod shall be stored in a compact group and shall be kept moist. Sod shall be prevented from freezing.
- c. Sod that has been damaged by poor handling or improper storage will be rejected by the Landscape Architect.

#### 1.8 PLANTING SEASON AND CONDITIONS

- A. Planting season for seeding shall be as follows:

<u>Item</u>	<u>Planting Period</u>
Seed Mix	Late summer, early fall preferred.
Wetland Seed Mix	Spring preferred; increase rates /straw mulch. per mfr. recommendations

- B. Planting season for sod shall be all season, except on frozen soil.
- C. Planting shall only be performed when weather and soil conditions are suitable for planting the material specified in accordance with locally accepted practice.

#### 1.9 MAINTENANCE

- A. Turfgrass shall be maintained by the Contractor until Substantial Completion, as described in Part 3 of this Section.
- B. Following Substantial Completion, maintenance of turfgrass shall become the Owner's responsibility with the following provisions.
- 1. The Contractor shall provide Owner with written recommended maintenance program at time of Substantial Completion.
  - 2. The Contractor may make as many periodic inspections as necessary during the guarantee period, at no additional cost to the Owner, to inspect the condition of all plant materials. Submit written report of each inspection to the Landscape Architect and Owner outlining corrective measures required to keep the guarantee valid.

#### 1.10 ACCEPTANCE

- A. Acceptance:

1. The Landscape Architect will inspect all work for Substantial Completion upon written request of the Contractor. The request shall be received at least ten calendar days before the anticipated date of inspection.
  2. Acceptance of material by the Landscape Architect will be for general conformance to specified requirements and shall not relieve the Contractor of responsibility for full conformance to the Contract Documents.
  3. Upon satisfactory completion and re-inspection of all repairs or renewals necessary in the judgment of the Landscape Architect, the Landscape Architect will recommend to the Owner that the work of this Section be accepted.
- B. Sod and seed areas will be accepted when in compliance with all the following conditions:
1. Roots are thoroughly knit to the soil;
  2. Absence of visible joints (sodded areas);
  3. All areas show a uniform stand of specified grass in healthy condition, individual bare spots of under 72 square inches or multiple bare spots not in excess of 1 percent of the area.
  4. At least 60 days have elapsed since the completion of work under this Section, or as approved by the Landscape Architect.
  5. A minimum amount of weeds may be acceptable, commensurate with the intended use.

## PART 2 - PRODUCTS

### 2.1 SEED

- A. Seed: Fresh, clean, dry, new-crop seed with clear percentages of the pure live seed (PLS) and bulk seed present.
- B. Turfgrass: It shall be standard grade seed of the most recent season's crop, with 0.5 percent or less weed seed, 1.75 percent or less crop seed by weight, and minimum 95 percent purity with minimum 85 percent germination. Seed shall be dry and free of mold. Seed shall meet the following requirements.
- C. Turf Grass Seed Species: Provide as follows:
  1. Full Sun: Perennial Ryegrass, Kentucky Bluegrass, Creeping Red/Chewings Fescue
  2. Partial Shade: Perennial Ryegrass, Creeping Red/Chewings Fescue, Kentucky Bluegrass

3. Shade: Red Fescue, Creeping Red/Chewings Fescue, Kentucky Bluegrass
4. Turf Grass Seed Mix: Proprietary seed mix as follows:
  - a. Products: Subject to compliance with requirements, [provide the following] [provide one of the following] [available products that may be incorporated into the Work include, but are not limited to, the following]:
    - 1) Agway Sunny Green or Wear Green (for sun)
    - 2) Agway Sun and Shade (for Partial Shade)
    - 3) Agway Shady Green (for Shade)

## 2.2 TURFGRASS SOD

- A. Turfgrass Sod: **[Certified] [Approved] [Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects]**, complying with "Specifications for Turfgrass Sod Materials" in Turfgrass Producers International's (TPI) "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
- B. Turfgrass Species: Sod shall be comprised of grass species as follows:
  1. Full Sun: Proportioned by weight as follows: Blend of Kentucky Bluegrass cultivars.
  2. Sun and Partial Shade: Proportioned by weight as follows: Blend of Kentucky Bluegrass cultivars, Perennial Ryegrass, Creeping Red & Chewings Fescues.
  3. Shade: Proportioned by weight as follows: Blend of Creeping Red, Chewing & Hard Fescue, and Kentucky Bluegrass cultivars.
- C. Sod shall be nursery grown on cultivated mineral agricultural soils. Sod shall have been mowed regularly and carefully, and otherwise maintained from planting to harvest.
- D. Thickness of Cut: Sod shall be machine cut at a uniform soil thickness of a 5/8 inch (16 mm), plus or minus a 1/4 inch (6 mm), at the time of cutting. Measurement for thickness shall exclude top growth and thatch.
- E. Section Size: Individual pieces of sod shall be cut to the supplier's standard width and length. Maximum allowable deviation from standard widths and lengths shall be plus or minus a 1/2 inch (12 mm) on width, and plus or minus 5 percent on length. Broken strips and torn and uneven ends will not be acceptable.
- F. Strength of Sod Strips: A standard section of sod, 6 feet (2 m) in length, shall be strong enough to support its own weight and retain its size and shape during installation.
- G. Moisture Content: Sod shall not be harvested or transplanted when moisture content (excessively dry or wet) may adversely affect its survival.

- H. Time Limitations: Sod shall be harvested, delivered, and transplanted within 24 to 30 hours from time of harvest unless a suitable preservation method is approved prior to delivery or as weather conditions warrant. Sod not transplanted within this period shall be inspected and approved by the Landscape Architect prior to its installation.
- I. Diseases, Nematodes, and Insects: Sod shall not exhibit symptoms of diseases, nematodes, or soil-borne insects.
- J. Weeds: A minimum amount of weeds may be acceptable, commensurate with the intended use.

## 2.3 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent, by weight. Class T is more finely ground and quicker acting but dustier than Class O.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Aluminum Sulfate: Commercial grade, unadulterated.
- E. Perlite: Horticultural perlite, soil amendment grade.
- F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 (0.30-mm) sieve.
- G. Sand: Clean, washed, natural or manufactured angular grains, free of toxic materials.

## 2.4 ORGANIC SOIL AMENDMENTS

- A. Compost: An organic substance produced by the biological and biochemical decomposition of source separated organic materials that may include leaves and lawn trimmings, food or industrial residuals, and/or municipal biosolids. The product shall not contain levels of substances toxic to plants and shall be reasonably free (< 1 percent by dry weight) of man-made foreign matter. It shall be well-composted, stable, and substantially weed-free organic matter, pH range of 5.5 to 8 percent, moisture content 35 to 55 percent by weight; soluble salt content of <3 mmhos/cm or <3 decisiemens/m and free of substances toxic to plantings; and as follows:
  - 1. The compost stock must mature for a minimum of 90 days. During this time, the compost stock shall achieve thermophilic temperatures (175 to 180 degrees F, 79 to 82 degrees C) for 15 days; multiple turnings may be required for the entire stockpile. A Solvita test may be requested to determine the maturity and stability of the compost.

2. Frozen or muddy compost shall be unacceptable for use.

- B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.
- C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent. Peat is an acceptable alternative to composted soil admixtures to increase organic content. Additional lime in the pelletized form shall be provided to readjust the pH.
- D. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
- E. Manure: Well-rotted, unbleached, stable cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.
- F. Mycorrhizal Fungi: Dry, organic, granular root stimulant/inoculant containing at least 5300 spores per pound (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per pound (0.45 kg) of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.
  - 1. Mycorrhizal fungi amendment shall be manufactured by one of the following, or approved equivalent:
    - a) Roots
    - b) Plant Health Care
    - c) Mycorrhizal Applications of Oregon

## 2.5 FERTILIZERS

- A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen. Nitrogen (N), Phosphorus (P) and Potassium (K) in amounts recommended in soil test results.
- B. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in amounts recommended in soil test results.

## 2.6 PLANTING MEDIA

- A. Topsoil, whether stripped from site or supplied from off-site, shall be a sandy loam or loam soil as defined by the USDA Soil Conservation Service, Soil Classification System, and shall have the following mechanical analysis:

Textural Class	% of Total Weight	Average %
Sand (0.05-2.0 mm dia. range)	45 to 75	60
Silt (0.002-0.05 mm dia. range)	15 to 35	25
Clay (less than 0.002 m dia. range)	5 to 25	15

- 95 percent of topsoil shall pass a .07-inch sieve.
- Topsoil shall be free of stones 1 in in longest dimension, earth clods, plant parts, and debris. All topsoil shall be screened using a 3/8 inch screen.
- Organic matter content shall be an average of 8 percent of total dry weight with a minimum of any sample being 6 percent.
- Topsoil shall have a pH value range of 6.0 to 6.5.
  - If planting soil mixture does not fall within the required pH range, limestone or aluminum sulfate shall be added to bring the pH within the specified limit.
  - If pH is below desired level add ground limestone. If pH is above desired level add aluminum sulfate.

- B. Compost Manufactured Topsoil: Uniform mixture of compost and base soil to achieve the compost manufactured topsoil product consisting of the following ingredients:

- Compost: See above, Section 2.4, A.
- Base soil: Topsoil and/or other soils (clay, silt, sand, sandy loam, or loamy sand in texture according to USDA soil classification. It shall be free of stones, clods, plant parts, weeds, and other debris >2 inches (50 mm) in any dimension. It shall not contain levels of substances that shall inhibit or be harmful to plant growth.

a. Product Parameters:

Parameter	Compost	Base Soil	Compost Manufactured Topsoil
pH	6.0-8.5	5.0-8.0	6.0-7.8
% Organic Matter	<40%	0-5%	6-20%
Particle Size	<1" (25 mm)	<2" (50 mm), USDA Class: sand, sandy loam, loamy sand	<2" (50 mm), USDA Class: sand, sandy loam, loamy sand
Salts/conductivity	Varies; must be reported	<2mmhos/cm after handling, placement & rainfall	<2mmhos/cm after handling, placement & rainfall
Carbon: Nitrogen Ratio	15-25:1	N/A	N/A

## 2.7 WATER

- A. Water shall be suitable for irrigation and free from ingredients harmful to seeded or sodded areas.

## 2.8 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Hay Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- C. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.
- C. Muck Peat Mulch: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.
- D. Compost Mulch: Well-composted, stable, and weed-free organic matter 50 to 60 percent of dry weight; pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch (25-mm) sieve; soluble salt content of 2 to 5 /m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.
- E. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent; and a pH range of 4.5 to 6.5.

## 2.9 CHEMICAL PRODUCTS

- A. General: Pesticides, herbicides, fungicides, bactericides or any other chemical compounds shall be registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless a licensed and authorized applicator is present. Also, applications will only be done with permission in writing by authorities having jurisdiction if applicable.
  - 1. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
  - 2. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

3. Fungicide: Shall be zinc ethylene bisdithiocarbonate (Zineb), or equal, applied at manufacturer's suggested rates.

## PART 3 - EXECUTION

### 3.1 PREPARATION OF SUBGRADE

- A. Subgrade shall be examined to ensure that rough grading and all other subsurface work in lawn areas and other areas to be seeded is done prior to start of finish grading.
- B. Existing subgrade shall be loosened or scarified to a minimum depth of 8 inches (20 cm), or as required to alleviate excessive soil compaction, prior to spreading topsoil. Subgrade shall be brought to true and uniform grade and shall be cleared of stones greater than 2 inches (5 cm), sticks, and other extraneous material.

### 3.2 PREPARATION OF TOPSOIL

- A. Topsoil shall not be spread until it is possible to follow immediately or within 24 hours with seeding or sodding operations. If topsoil is spread prior to this time, it shall be cultivated to loosen soil prior to seeding or sodding.
- B. Topsoil shall not be placed when subgrade or topsoil material are frozen, excessively wet, or excessively dry.
- C. Topsoil shall be spread in a uniform layer, to a thickness, which will compact to the depth required to bring final lawn and grass surfaces to required elevation. Unless otherwise indicated minimum depth of topsoil shall be 6 inches (15 cm) after compaction.
- D. Surfaces shall be graded and smoothed, eliminating all sharp breaks by rounding, scraping off bumps and ridges, and filling in holes and cuts.

### 3.3 FINISH GRADING

- A. Final surface of topsoil immediately before seeding shall be within  $\pm 1/2$  inch (13 mm) of required elevation, with no ruts, mounds, ridges, or other faults, and no pockets or low spots in which water can collect. Stones, roots, and other debris greater than 1 in. in any dimension, which are visible at the surface, shall be removed and the resulting holes filled with topsoil, leaving a uniform planar surface.
- B. Finish grade surface with a drag or rake. Round out all breaks in grade, smooth down all lumps and ridges; fill in all holes and crevices. Rolling with a light roller is acceptable if the surface is scarified afterward.
- C. In the event of settlement, the Contractor shall readjust the work to required finished grade.

### 3.4 SEED APPLICATION

- A. Seed shall be broadcast by means of an approved mechanical seeder, to give a uniform application at the following rates:

Seed Application Rate

lb./1,000 square feet

- B. Seed shall be applied in two equal applications for uniform coverage; direction of travel of spreader for second pass shall be perpendicular to that of the first pass. Seeding shall not be done when it is raining or snowing, or when wind velocity exceeds 5 miles per hour. (8 km/h)
- C. Following seeding the area shall be lightly raked to incorporate seed with top 1/8 to 1/4 inch (3 mm to 6 mm) of soil. Area shall then be fine graded. Stones and other debris greater than 1 in. in any dimension which are visible on surface shall be removed. Surface shall be rolled with a hand roller having a weight of 60 to 90 pounds per foot (27 to 40 kg) of width, and a minimum diameter of 2 feet (0.6 m)
- D. Mulch seeded areas to prevent erosion and to protect seed from hot or dry weather or drying winds.
- E. Following seeding, raking and rolling, entire area shall be watered. Initial watering shall continue until water has reached a depth of 2 inches (50 mm) over entire seeded surface, at a rate which will not dislodge the seed. Watering shall be repeated thereafter as frequently as required to prevent drying of the surface, until the grass is established. Watering methods and apparatus which may cause erosion of the surface shall not be permitted.

### 3.5 SODDING

- A. Edges of the sodded areas shall be smooth, and all sodded areas shall conform to the design cross sections and grade. At edges adjacent to curbs, paved areas, etc., top surface of earth in sod shall be 1/2 inch (12 mm) below adjacent hard surface.
- B. Sod shall be placed, and all sodding operations completed within 36 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- C. On slopes 3 H:1 V or steeper, sod shall be placed perpendicular to the slope fastened in place with approved methods, spaced at not less than 1 pin per square foot.
- D. Surface of completed sodded area shall be smooth. Sod shall be laid edge-to-edge, with tight-butted, staggered joints. Sod shall be carefully placed to ensure that it is neither stretched or overlapped. Immediately after laying sod shall be pressed firmly into contact with sod bed by tamping or rolling, to eliminate air pockets. Following compaction, topsoil shall be used to fill all cracks, and excess soil shall be worked into grass with rakes or other suitable equipment. Sod shall not be smothered with excess

fill soil.

- E. Immediately after sodding operations have been completed, entire surface shall be rolled with a roller or other approved equipment weighing 100 to 160 pounds per foot of roller.
- F. Saturate sod with fine water spray within two hours of planting, or sooner as weather conditions warrant. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 2 inches below sod.

### 3.6 HYDROSEEDING

- A. Seeding may be done with the hydraulic spray method where approved. It shall be done with a commercial machine designed for the hydraulic application of seed mix in a slurry. The seed and additional material shall be mixed with sufficient water in the tank of the machine. The slurry shall be thoroughly and constantly agitated, so the materials are uniformly mixed and suspended in the water at all times until tank is emptied. The seed slurry will be uniformly distributed over the designated area to be seeded.
- B. Application rates used shall conform with the manufacturer's labels for the materials used in the slurry and as soil tests dictate.
- C. Hydroseeding on slopes shall conform with the manufacturer's labels for the materials used in the slurry and as soil tests dictate.
- D. During the first two to three weeks or until uniform grass catch, water daily or more frequently, as necessary, to maintain moist soil to a minimum depth of 2 inches.
- E. Erosion control material, such as netting or bonded fiber matrix, shall be used when the slope or water movements dictates.

### 3.7 APPLICATION OF FERTILIZER AND AMENDMENTS

- A. Fertilizer and conditioners shall be applied according to the Turfgrass Best Management Practices.
- B. Fertilizer and supplemental conditioners shall be applied according to the type, rate, and timing recommended by the test reports from a qualified soil-testing laboratory. and in accordance with applicable industry standards.
- C. Mixing with topsoil:
  - 1. Fertilizer and conditioners shall be spread over the entire areas designated at the recommended application rates.
  - 2. Materials shall be uniformly and thoroughly mixed into the top 4 in. of topsoil by disking, rototilling, or other approved method.

### 3.8 MAINTENANCE

- A. Except as otherwise specified below, maintenance shall include all operations required to produce an established lawn, including but not limited to: Fertilizing, resodding, mowing, weeding, watering, or reseeding.
- B. Maintenance of seeded areas shall begin upon completion of seeding and shall continue until full turf establishment and final acceptance of the lawn or seeded area.
- C. Maintenance of sodded areas shall begin upon completion of sodding and shall continue until final acceptance.
- D. First mowing of seeded areas shall be done when average height of grass is 3 to 5 inches, removing no more than 1/3 of grass-leaf growth. Repeat mowing to maintain height appropriate for species without cutting more than 1/3 of grass height.
- E. If lawn or grass is installed in the fall and maintenance is required to continue into spring months, lawn and grass shall receive an application of amendments and fertilizer in the spring in accordance with industry standards for new lawn establishment. Amendments and fertilizer shall be spread in a uniform layer over the entire lawn surface, as specified herein.

END OF SECTION 329200

## **SECTION 33 05 00 - COMMON WORK RESULTS FOR UTILITIES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes the following:
  - 1. Piping joining materials.
  - 2. Dielectric fittings.
  - 3. Sleeves.
  - 4. Identification devices.
  - 5. Grout.
  - 6. Piping system common requirements.
  - 7. Equipment installation common requirements.
  - 8. Concrete bases.
  - 9. Metal supports and anchorages.

#### **1.2 DEFINITIONS**

- A. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
- B. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

#### **1.3 ACTION SUBMITTALS**

- A. Product Data: For the following:
  - 1. Dielectric fittings.
  - 2. Identification devices.

#### **1.4 INFORMATIONAL SUBMITTALS**

- A. Welding certificates.

#### **1.5 QUALITY ASSURANCE**

- A. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
  2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

## PART 2 - PRODUCTS

### 2.1 PIPING JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch maximum thickness, unless otherwise indicated.
    - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
    - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
  2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- B. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
- F. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- G. Solvent Cements for Joining Plastic Piping:
1. ABS Piping: ASTM D 2235.
  2. CPVC Piping: ASTM F 493.
  3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
  4. PVC to ABS Piping Transition: ASTM D 3138.
- H. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

## 2.2 DIELECTRIC FITTINGS

- A. Dielectric Fittings, General: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
- B. Dielectric Unions:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Zurn Industries, LLC.
  - 2. Description: Factory fabricated, union, NPS 2 and smaller.
    - a. Pressure Rating: 150 psig minimum at 180 deg F.
    - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.
- C. Dielectric Flanges:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Zurn Industries, LLC.
  - 2. Description: Factory-fabricated, bolted, companion-flange assembly, NPS 2-1/2 to NPS 4 and larger.
    - a. Pressure Rating: 300 psig minimum.
    - b. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- D. Dielectric Couplings:
  - 1. Zurn Industries, LLC.
  - 2. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, NPS 3 and smaller.
    - a. Pressure Rating: 300 psig at 225 deg F.
    - b. End Connections: Threaded.
- E. Dielectric Nipples:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
    - a. Precision Plumbing Products.
  - 2. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.
    - a. Pressure Rating: 300 psig at 225 deg F .
    - b. End Connections: Threaded or grooved.

## 2.3 SLEEVES

- A. Mechanical sleeve seals for pipe penetrations are specified in Section 22 05 17 "Sleeves and Sleeve Seals for Plumbing Piping."
- B. Galvanized-Steel Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

- C. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.
- D. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- E. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
- F. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.
- G. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

## 2.4 IDENTIFICATION DEVICES

- A. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
  - 1. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
  - 2. Location: Accessible and visible.
- B. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.
- C. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.
- D. Pipes with OD, Including Insulation, Less Than 6 Inches: Full-band pipe markers, extending 360 degrees around pipe at each location.
- E. Pipes with OD, Including Insulation, 6 Inches and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.
- F. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
  - 1. Arrows: Either integrally with piping system service lettering to accommodate both directions of flow, or as separate unit on each pipe marker to indicate direction of flow.
- G. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least 3 mils thick.
  - 1. Width: 1-1/2 inches on pipes with OD, including insulation, less than 6 inches; 2-1/2 inches for larger pipes.
  - 2. Color: Comply with ASME A13.1, unless otherwise indicated.
- H. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch sequenced numbers. Include 5/32-inch hole for fastener.
  - 1. Material: 0.032-inch-thick, polished brass.

2. Material: 0.0375-inch-thick stainless steel.
  3. Material: 3/32-inch-thick plastic laminate with 2 black surfaces and a white inner layer.
  4. Material: Valve manufacturer's standard solid plastic.
  5. Size: 1-1/2 inches in diameter, unless otherwise indicated.
  6. Shape: As indicated for each piping system.
- I. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.
- J. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
1. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
  2. Thickness: 1/16 inch, unless otherwise indicated.
  3. Thickness: 1/16 inch, for units up to 20 sq. in. or 8 inches in length, and 1/8 inch for larger units.
  4. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.
- K. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:
1. Green: Cooling equipment and components.
  2. Yellow: Heating equipment and components.
  3. Brown: Energy reclamation equipment and components.
  4. Blue: Equipment and components that do not meet criteria above.
  5. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
  6. Terminology: Match schedules as closely as possible. Include the following:
    - a. Name and plan number.
    - b. Equipment service.
    - c. Design capacity.
    - d. Other design parameters such as pressure drop, entering and leaving conditions, and speed.
  7. Size: 2-1/2 by 4 inches for control devices, dampers, and valves; 4-1/2 by 6 inches for equipment.

## 2.5 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
1. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
  2. Design Mix: 5000-psi, 28-day compressive strength.
  3. Packaging: Premixed and factory packaged.

## PART 3 - EXECUTION

### 3.1 DIELECTRIC FITTING APPLICATIONS

- A. Dry Piping Systems: Connect piping of dissimilar metals with the following:
  - 1. NPS 2 and Smaller: Dielectric unions.
  - 2. NPS 2-1/2 and Larger: Dielectric flanges.
- B. Wet Piping Systems: Connect piping of dissimilar metals with the following:
  - 1. NPS 2 and Smaller: Dielectric couplings or dielectric nipples.
  - 2. NPS 2-1/2 and Larger: Dielectric nipples.

### 3.2 PIPING INSTALLATION

- A. Install piping according to the following requirements and utilities Sections specifying piping systems.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping to permit valve servicing.
- E. Install piping at indicated slopes.
- F. Install piping free of sags and bends.
- G. Install fittings for changes in direction and branch connections.
- H. Select system components with pressure rating equal to or greater than system operating pressure.
- I. Sleeves are not required for core-drilled holes.
- J. Permanent sleeves are not required for holes formed by removable PE sleeves.
- K. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
  - 1. Cut sleeves to length for mounting flush with both surfaces.
    - a. Exception: Extend sleeves installed in floors of equipment areas or other wet areas 2 inches above finished floor level.
  - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

- a. PVC and Steel Pipe Sleeves: For pipes smaller than NPS 6.
  - b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.
- L. Verify final equipment locations for roughing-in.
- M. Refer to equipment specifications in other Sections for roughing-in requirements.

### 3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and utilities Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
- 1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
  - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- G. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- H. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.
- I. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- J. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.

- K. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
  - 1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
  - 2. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
  - 3. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
  - 4. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
  - 5. PVC Nonpressure Piping: Join according to ASTM D 2855.
  - 6. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
- L. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
- M. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
- N. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
  - 1. Plain-End PE Pipe and Fittings: Use butt fusion.
  - 2. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
- O. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

### 3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
  - 1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
  - 2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
  - 3. Install dielectric fittings at connections of dissimilar metal pipes.

### 3.5 EQUIPMENT INSTALLATION

- A. Install equipment level and plumb, unless otherwise indicated.
- B. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
- C. Install equipment to allow right of way to piping systems installed at required slope.

### 3.6 IDENTIFICATION

- A. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
  - 1. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.
  - 2. Locate pipe markers on exposed piping according to the following:
    - a. Near each valve and control device.
    - b. Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
    - c. Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
    - d. At manholes and similar access points that permit view of concealed piping.
    - e. Near major equipment items and other points of origination and termination.
- B. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.
  - 1. Lettering Size: Minimum 1/4 inch high for name of unit if viewing distance is less than 24 inches, 1/2 inch high for distances up to 72 inches, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
  - 2. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- C. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

### 3.7 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
  - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
  - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of base.
  - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
  - 4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
  - 5. Install anchor bolts to elevations required for proper attachment to supported equipment.
  - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
  - 7. Use 4000-psi, 28-day compressive-strength concrete and reinforcement as specified in Section 03 30 00 "Cast-in-Place Concrete."

### 3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to Section 05 50 00 "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

### 3.9 GROUTING

- A. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

END OF SECTION 330500

## **SECTION 334100 - STORM UTILITY DRAINAGE PIPING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Pipe and fittings.
  - 2. Channel drainage systems.
  - 3. Encasement for piping.
  - 4. Manholes.
  - 5. Cleanouts.
  - 6. Nonpressure transition couplings.
  - 7. Expansion joints.
  - 8. Catch basins.
  - 9. Stormwater inlets.
  - 10. Pipe outlets.

#### **1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
  - 1. Manholes: Include plans, elevations, sections, details, frames, and covers.
  - 2. Catch basins and stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.

#### **1.3 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
- B. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
- C. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
- D. Field quality-control reports.

## 1.4 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Architect and the Owner no fewer than two days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of service without the Owner's written permission.

## PART 2 - PRODUCTS

### 2.1 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 74, Service class.
- B. Gaskets: ASTM C 564, rubber.
- C. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

### 2.2 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Heavy-Duty, Shielded Couplings:
  - 1. Description: ASTM C 1277 and ASTM C 1540, with stainless-steel shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

### 2.3 DUCTILE-IRON, CULVERT PIPE AND FITTINGS

- A. Pipe: ASTM A 716, for push-on joints.
- B. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.
- C. Compact Fittings: AWWA C153, for push-on joints.
- D. Gaskets: AWWA C111, rubber.

### 2.4 PE PIPE AND FITTINGS

- A. Corrugated PE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
  - 1. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.

2. Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.

- B. Corrugated PE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294M, Type S, with smooth waterway for coupling joints.

1. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
2. Soiltight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.

## 2.5 PVC PIPE AND FITTINGS

- A. PVC Corrugated Sewer Piping:

1. Pipe: ASTM F 949, PVC, corrugated pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM F 949, PVC molded or fabricated, socket type.
3. Gaskets: ASTM F 477, elastomeric seals.

## 2.6 CONCRETE PIPE AND FITTINGS

- A. Nonreinforced-Concrete Sewer Pipe and Fittings: ASTM C 14, Class 2, with bell-and-spigot or tongue-and-groove ends and gasketed joints with ASTM C 443, rubber gaskets.

- B. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76.

1. Bell-and-spigot or tongue-and-groove ends and sealant joints with ASTM C 990, bitumen or butyl-rubber sealant
2. Class II, Wall B.
3. Class III, Wall B.
4. Class IV, Wall B.
5. Class V, Wall C.

## 2.7 NONPRESSURE TRANSITION COUPLINGS

- A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

- B. Sleeve Materials:

1. For Concrete Pipes: ASTM C 443, rubber.
2. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
3. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
4. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

- C. Unshielded, Flexible Couplings:

1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded, Flexible Couplings:

1. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type, Flexible Couplings:

1. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

## 2.8 EXPANSION JOINTS

A. Ductile-Iron Flexible Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - a. Star Pipe Products or approved equivalent
2. Description: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for 250-psig minimum working pressure and for offset and expansion indicated.

## 2.9 CLEANOUTS

A. Cast-Iron Cleanouts:

1. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
2. Top-Loading Classification(s): Medium Duty and Heavy Duty.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. Plastic Cleanouts:

1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

## 2.10 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Material: high-density, cross-laminated polyethylene film of 0.004-inch minimum thickness.

C. Form: tube.

D. Color: Black or natural.

## 2.11 MANHOLES

### A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches.
10. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

### B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser with 4-inch-minimum width flange and 26-inch-diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
2. Material: ASTM A 48/A 48M, Class 35 gray iron unless otherwise indicated.

## 2.12 CONCRETE

### A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
  - 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
  - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.
- C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.
  - 1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
    - a. Invert Slope: 2 percent through manhole.
  - 2. Benches: Concrete, sloped to drain into channel.
    - a. Slope: 4 percent.
- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
  - 1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
  - 2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

## 2.13 POLYMER-CONCRETE, CHANNEL DRAINAGE SYSTEMS

- A. General Requirements for Polymer-Concrete, Channel Drainage Systems: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include quantity of units required to form total lengths indicated.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ABT, Inc.
  - 2. Innovative Plastic, Inc.
  - 3. Polycast: Hubbell Power Systems, Inc.
  - 4. Or approved equivalent
- C. Sloped-Invert, Polymer-Concrete Systems:
  - 1. Channel Sections:
    - a. Interlocking-joint, precast, modular units with end caps.
    - b. 4-inch inside width and deep, rounded bottom, with built-in invert slope of 0.6 percent and with outlets in quantities, sizes, and locations indicated.
    - c. Extension sections necessary for required depth.
    - d. Frame: Include gray-iron or steel frame for grate.
  - 2. Grates:
    - a. Manufacturer's designation "Heavy Duty," with slots or perforations that fit recesses in channels.
    - b. Material: Gray iron.
  - 3. Covers: Solid gray iron if indicated.
  - 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.

- D. Narrow-Width, Level-Invert, Polymer-Concrete Systems:
  - 1. Channel Sections:
    - a. Interlocking-joint, precast, modular units with end caps.
    - b. 5-inch inside width and 9-3/4-inch-deep, rounded bottom, with level invert and with NPS 4 outlets in quantities, sizes, and locations indicated.
  - 2. Grates:
    - a. Slots or perforations that fit recesses in channels.
    - b. Material: Gray iron.
  - 3. Covers: Solid gray iron if indicated.
  - 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- E. Wide-Width, Level-Invert, Polymer-Concrete Systems:
  - 1. Channel Sections:
    - a. Interlocking-joint, precast, modular units with end caps.
    - b. 8-inch inside width and 13-3/4-inch-deep, rounded bottom, with level invert and with outlets in quantities, sizes, and locations indicated.
  - 2. Grates:
    - a. Slots or other openings that fit recesses in channels.
    - b. Material: Gray iron.
  - 3. Covers: Solid gray iron if indicated.
  - 4. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
- F. Drainage Specialties: Precast, polymer-concrete units.
  - 1. Large Catch Basins:
    - a. 24-by-12-inch polymer-concrete body, with outlets in quantities and sizes indicated.
    - b. Gray-iron slotted grate.
    - c. Frame: Include gray-iron or steel frame for grate.
  - 2. Small Catch Basins:
    - a. 19- to 24-inch by approximately 6-inch polymer-concrete body, with outlets in quantities and sizes indicated.
    - b. Gray-iron slotted grate.
    - c. Frame: Include gray-iron or steel frame for grate.
  - 3. Oil Interceptors:
    - a. Polymer-concrete body with interior baffle and four steel support channels and two 1/4-inch-thick, steel-plate covers.
    - b. Steel-plate covers.
    - c. Capacity: 200 gal.
    - d. Inlet and Outlet: NPS 6.
  - 4. Sediment Interceptors:
    - a. 27-inch-square, polymer-concrete body, with outlets in quantities and sizes indicated.
    - b. 24-inch-square, gray-iron frame and slotted grate.
- G. Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.

- H. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.

## 2.14 CATCH BASINS

- A. Standard Precast Concrete Catch Basins:
1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
  2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
  3. Riser Sections: 4-inch minimum thickness, 48-inch diameter, and lengths to provide depth indicated.
  4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
  5. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
  6. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
  7. Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and grate.
  8. Steps: Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 48 inches.
  9. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.
- B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small, square or short-slotted drainage openings.
1. Size: 24 by 24 inches minimum unless otherwise indicated.
  2. Grate Free Area: Approximately 50 percent unless otherwise indicated.
- C. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24-inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter flat grate with small, square or short-slotted drainage openings.
1. Grate Free Area: Approximately 50 percent unless otherwise indicated.

## 2.15 STORMWATER INLETS

- A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to utility standards.

- B. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
- C. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
- D. Frames and Grates: Heavy duty, according to utility standards.

## 2.16 PIPE OUTLETS

- A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.
- B. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."
  - 1. Average Size: NSSGA No. R-3, screen opening 2 inches.
  - 2. Average Size: NSSGA No. R-4, screen opening 3 inches.
  - 3. Average Size: NSSGA No. R-5, screen opening 5 inches.
- C. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.
- D. Energy Dissipaters: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, 3-ton average weight armor stone, unless otherwise indicated.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving."

### 3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
  - 1. Install piping pitched down in direction of flow.
  - 2. Install piping ADS 12" and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
  - 3. Install piping with 48-inch minimum cover.
  - 4. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
  - 5. Install hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
  - 6. Install ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
  - 7. Install PE corrugated sewer piping according to ASTM D 2321.
  - 8. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
  - 9. Install nonreinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
  - 10. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
- G. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:
  - 1. Hub-and-spigot, cast-iron soil pipe and fittings.
  - 2. Hubless cast-iron soil pipe and fittings.
  - 3. Ductile-iron pipe and fittings.
  - 4. Expansion joints.

### 3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
  - 1. Join hub-and-spigot, cast-iron soil piping with gasketed joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
  - 2. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
  - 3. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
  - 4. Join ductile-iron culvert piping according to AWWA C600 for push-on joints.
  - 5. Join ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
  - 6. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
  - 7. Join PVC corrugated sewer piping according to ASTM D 2321 for elastomeric-seal joints.

8. Join nonreinforced-concrete sewer piping according to ASTM C 14 and ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
9. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
10. Join dissimilar pipe materials with nonpressure-type flexible couplings.

### 3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
  1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
  2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
  3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
  4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.
- B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

### 3.5 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops at grade elsewhere unless otherwise indicated.

### 3.6 CATCH BASIN INSTALLATION

- A. Set frames and grates to elevations indicated.

### 3.7 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Construct riprap of broken stone, as indicated.

- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.

### 3.8 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

### 3.9 CHANNEL DRAINAGE SYSTEM INSTALLATION

- A. Install with top surfaces of components, except piping, flush with finished surface.
- B. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.
- C. Embed channel sections and drainage specialties in 4-inch minimum concrete around bottom and sides.
- D. Fasten grates to channel sections if indicated.
- E. Assemble channel sections with flanged or interlocking joints.
- F. Embed channel sections in 4-inch minimum concrete around bottom and sides.

### 3.10 CONNECTIONS

- A. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Section 22 14 13 "Facility Storm Drainage Piping."
- B. Make connections to existing piping and underground manholes.
  - 1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
  - 2. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
  - 3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase

- entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
    - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
    - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
  - 4. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
- C. Connect to sediment interceptors specified in Section 22 13 23 "Sanitary Waste Interceptors."
- D. Pipe couplings and expansion joints with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
- 1. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
    - a. Shielded flexible couplings for same or minor difference OD pipes.
    - b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
    - c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

### 3.11 IDENTIFICATION

- A. Materials and their installation are specified in Section 31 20 00 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
- 1. Use warning tape or detectable warning tape over ferrous piping.
  - 2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

### 3.12 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
- 1. Submit separate reports for each system inspection.
  - 2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
  4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
  2. Test completed piping systems according to requirements of authorities having jurisdiction.
  3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
  4. Submit separate report for each test.
  5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
    - a. Exception: Piping with soil tight joints unless required by authorities having jurisdiction.
    - b. Option: Test plastic piping according to ASTM F 1417.
    - c. Option: Test concrete piping according to ASTM C 924.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

END OF SECTION 334100

## **SECTION 334600 - SUBDRAINAGE**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

**A. Section Includes:**

1. Perforated-wall pipe and fittings.
2. Geotextile filter fabrics.

#### **1.2 ACTION SUBMITTALS**

**A. Product Data:** For geotextile filter fabrics.

### **PART 2 - PRODUCTS**

#### **2.1 PERFORATED-WALL PIPES AND FITTINGS**

- A. Perforated PE Pipe and Fittings:** ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.

#### **2.2 SOIL MATERIALS**

- A. Soil materials** are specified in Section 312000 "Earth Moving."

#### **2.3 WATERPROOFING FELTS**

- A. Material:** Comply with ASTM D 226, Type I, asphalt or ASTM D 227, coal-tar-saturated organic felt.

#### **2.4 GEOTEXTILE FILTER FABRICS**

- A. Description:** Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.
- B. Structure Type:** Nonwoven, needle-punched continuous filament.
1. Survivability: AASHTO M 288 Class 2.
  2. Styles: Flat and sock.

## PART 3 - EXECUTION

### 3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

### 3.2 FOUNDATION DRAINAGE INSTALLATION

- A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than 6 inches deep and 12 inches wide.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.
- F. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.
- H. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- I. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.
- J. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

### 3.3 UNDERSLAB DRAINAGE INSTALLATION

- A. Excavate for underslab drainage system after subgrade material has been compacted but before drainage course has been placed. Include horizontal distance of at least 6 inches between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than 4 inches.
- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for underslab subdrainage.
- F. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.

### 3.4 PIPING INSTALLATION

- A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
  - 1. Foundation Subdrainage: Install piping level and with a minimum cover of 48 inches unless otherwise indicated.
  - 2. Underslab Subdrainage: Install piping level.
  - 3. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of 48 inches unless otherwise indicated.
  - 4. Lay perforated pipe with perforations down.
  - 5. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.
- B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- C. Install thermoplastic piping according to ASTM D 2321.

### 3.5 PIPE JOINT CONSTRUCTION

- A. Join perforated PE pipe and fittings with couplings according to ASTM D 3212 with loose banded, coupled, or push-on joints.
- B. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

### 3.6 BACKWATER VALVE INSTALLATION

- A. Comply with requirements for backwater valves specified in Section 334100 "Storm Utility Drainage Piping."
- B. Install horizontal backwater valves in header piping downstream from perforated subdrainage piping.
- C. Install horizontal backwater valves in piping where indicated.

### 3.7 CLEANOUT INSTALLATION

- A. Comply with requirements for cleanouts specified in Section 334100 "Storm Utility Drainage Piping."
- B. Cleanouts for Foundation Subdrainage:
  - 1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
  - 2. In vehicular-traffic areas, use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 18 by 18 by 12 inches deep. Set top of cleanout flush with grade.
  - 3. In nonvehicular-traffic areas, use NPS 4 PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches deep. Set top of cleanout 1 inch above grade.
  - 4. Comply with requirements for concrete specified in Section 033000 "Cast-in-Place Concrete."
- C. Cleanouts for Underslab Subdrainage:
  - 1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
  - 2. Use NPS 4 cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab.

### 3.8 CONNECTIONS

- A. Comply with requirements for piping specified in Section 334100 "Storm Utility Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect low elevations of subdrainage system to building's solid-wall-piping storm drainage system.

### 3.9 FIELD QUALITY CONTROL

#### A. Tests and Inspections:

1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

#### B. Drain piping will be considered defective if it does not pass tests and inspections.

#### C. Prepare test and inspection reports.

### 3.10 CLEANING

- #### A.
- Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 334600